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## NOVEL POLYPEPTIDES AND NUCLEIC ACIDS ENCODING SAME

### RELATED APPLICATIONS

5 This application claims priority to USSN 60/171,746, filed December 22, 1999, which is incorporated herein by reference.

### BACKGROUND OF THE INVENTION

Mammals are able to discriminate between thousands of odor molecules. This capacity  
10 relies on a multigene family encoding 500 - 1000 olfactory receptors (ORX) *See* Buck et al.,  
(1991) *Cell* **65**, 175-187. These receptors are expressed mainly in the olfactory epithelium and  
have been found in a number of species including mammals, birds, amphibians, and fish. *See*  
Buck et al., *supra*, (1991) *Cell* **65**, 175-187; Selbie et al., (1992) *Mol. Brain Res.* **13**, 159-163;  
Rouquier et al., (1998) *Nature Genet.* **18**, 243-50.; Issel-Tarver et al., (1997) *Genetics* **145**,  
15 185-195; Sullivan et al., (1996) *Proc. Natl. Acad. Sci. USA* **93**, 884-888; Nef et al., (1992)  
*Proc. Natl. Acad. Sci USA* **89**, 8948-8952; Leibovici et al., (1996) *Dev. Biol.* **175**, 118-131;  
Freitag et al., (1995) *Neuron* **15**, 1383-1392; Ngai et al., (1993) *Cell* **72**, 657-666.

All of these receptors belong to the G protein-coupled receptor (GPCR) superfamily  
and share features of sequence and structure, such as seven hydrophobic transmembrane  
20 domains (7TM).

The sense of smell plays an important role in mammalian social behavior, location of  
food and detection of predators. However, mammals vary in their olfactory ability. *See*  
Moulton (1967) *Am. Zool.* **7**, 421-429; Stoddart (1980) *The ecology of vertebrate olfaction*  
(Chapman and Hall, New York).

25 In primates, the sense of smell is greatly reduced (*i.e.*, microsmatic) with respect to  
other mammals such as dogs or rodents. *See* Moulton, *supra*; Stoddart, *supra*; Issel-Tarver, L.,  
Rine, J. (1996) *Proc. Natl. Acad. Sci. USA* **93**, 10897-10902.

30 Various explanations for the differences in olfactory performance have been  
hypothesized. Differences in the anatomical structures (size, location) devoted to olfaction  
could  
partly explain these differences. For example, dogs, which have an olfactory sensitivity up to  
100 times greater than humans, have on average ~100 cm<sup>2</sup> of olfactory epithelium while

humans have only 10 cm<sup>2</sup>.

Variations in the size and diversity of the expressed ORX gene family could also account

for these differences. It has recently been demonstrated that the human ORX gene repertoire is  
5 distributed in over 25 chromosomal sites. Over 70% of these ORX genes are pseudogenes, *i.e.* the sequences have accumulated deleterious mutations such as in-frame stop codons and/or  
indel

frameshifts. See Rouquier et al., (1998) *Nature Genet.* **18**, 243-50. Thus, the reduction of the  
sense of smell observed in primates could parallel the reduction of the number of functional  
10 ORX genes.

## SUMMARY OF THE INVENTION

The invention is based, in part, upon the discovery of novel polynucleotide sequences encoding novel polypeptides.

15 Accordingly, in one aspect, the invention provides an isolated nucleic acid molecule that includes the sequence an ORX nucleic acid molecule or a fragment, homolog, analog or derivative thereof. The nucleic acid can include, *e.g.*, a nucleic acid sequence encoding a polypeptide at least 80% identical to a polypeptide that includes the amino acid sequence of an ORX polypeptide. The nucleic acid can be, *e.g.*, a genomic DNA fragment, or a cDNA  
20 molecule.

Also included in the invention is a vector containing one or more of the nucleic acids described herein, and a cell containing the vectors or nucleic acids described herein.

The invention is also directed to host cells transformed with a vector comprising any of the nucleic acid molecules described above.

25 In another aspect, the invention includes a pharmaceutical composition that includes an ORX nucleic acid and a pharmaceutically acceptable carrier or diluent.

In a further aspect, the invention includes a substantially purified ORX polypeptide, *e.g.*, any of the ORX polypeptides encoded by an ORX nucleic acid, and fragments, homologs, analogs, and derivatives thereof. The invention also includes a pharmaceutical composition  
30 that includes an ORX polypeptide and a pharmaceutically acceptable carrier or diluent.

In still a further aspect, the invention provides an antibody that binds specifically to a ORX polypeptide. The antibody can be, *e.g.*, a monoclonal or polyclonal antibody, and fragments, homologs, analogs, and derivatives thereof. The invention also includes a pharmaceutical composition including ORX antibody and a pharmaceutically acceptable carrier or diluent. The invention is also directed to isolated antibodies that bind to an epitope on a polypeptide encoded by any of the nucleic acid molecules described above.

5 The invention also includes kits comprising any of the pharmaceutical compositions described above.

The invention further provides a method for producing an ORX polypeptide by providing a cell containing an ORX nucleic acid, *e.g.*, a vector that includes an ORX nucleic acid, and culturing the cell under conditions sufficient to express the ORX polypeptide encoded by the nucleic acid. The expressed ORX polypeptide is then recovered from the cell. Preferably, the cell produces little or no endogenous ORX polypeptide. The cell can be, *e.g.*, a prokaryotic cell or eukaryotic cell.

10 The invention is also directed to methods of identifying an ORX polypeptide or nucleic acid in a sample by contacting the sample with a compound that specifically binds to the polypeptide or nucleic acid, and detecting complex formation, if present.

15 The invention further provides methods of identifying a compound that modulates the activity of an ORX polypeptide by contacting an ORX polypeptide with a compound and determining whether the ORX polypeptide activity is modified.

20 The invention is also directed to compounds that modulate ORX polypeptide activity identified by contacting an ORX polypeptide with the compound and determining whether the compound modifies activity of the ORX polypeptide, binds to the ORX polypeptide, or binds to a nucleic acid molecule encoding an ORX polypeptide.

25 The invention also provides a method for assessing the olfactory acuity of a subject by providing a biological sample comprising nucleic acids from the subject, identifying a plurality of nucleic acid sequences homologous to an olfactory receptor nucleic acid sequence, determining the number of sequences containing open-reading frames, determining the number of sequences containing olfactory receptor pseudogenes, and comparing the number of open-reading frames to the number of pseudogenes to assess the olfactory acuity of the subject. In one embodiment, the invention provides a method of determining the plurality of nucleic acids

using a pair of primers that selectively amplify an olfactory receptor nucleic acid sequence. In a further embodiment, this pair of primers includes OR5B-OR3B (OR5B (TM2), 5'-  
CCCATGTA(T/C)TT(G/C/T)TT(C/T)CTC(A/G/T)(G/C)(C/T)AA(C/T)(T/C)T(G/A)TC-3'  
(SEQ ID NO: 432) and 5'-AG(A/G)C(A/T)(A/G)TAIATGAAIGG(A/G)TTCAICAT-3' (SEQ  
5 ID NO:433). In a still further embodiment, the ratio of the number of sequences containing open-reading frames to the number of sequences containing olfactory receptor pseudogenes is calculated and compared to a reference ratio for an organism whose olfactory acuity is known.

Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention  
10 belongs. Although methods and materials similar or equivalent to those described herein can be used in the practice or testing of the present invention, suitable methods and materials are described below. All publications, patent applications, patents, and other references mentioned herein are incorporated by reference in their entirety. In the case of conflict, the present specification, including definitions, will control. In addition, the materials, methods,  
15 and examples are illustrative only and not intended to be limiting.

Other features and advantages of the invention will be apparent from the following detailed description and claims.

#### BRIEF DESCRIPTION OF THE DRAWINGS

20 FIG. 1 is a schematic phylogeny tree of the primate species used in the Examples.  
FIG. 2 is a comparison of the deduced protein ORX sequences obtained from the different primate species characterized. The dendrogram was established using the PileUp program from the GCG Package. Percent amino acid similarity (ASI) was determined by pairwise sequence comparisons using the Gap program and is indicated along the abscissa of  
25 the tree. Sequences obtained from the literature are indicated by an asterisk. For example, human ORX sequences derived from the use of the OR3B/OR5B primers and representing the main ORX families were selected from Rouquier et al., *Nature Genet.* (1998) 18, 243-50 and Rouquier et al. (1998) *Hum. Mol. Genet.* 7, 1337-1345. Dog (CfOLF1 and its human counterpart HsOLF1; CfOLF2) and chicken (COR4) sequences were selected from Issel-Tarver et al. (1997) *Genetics* 145, 185-195 and Leibovici et al., (1996) *Dev. Biol.* 175, 118-30 131, respectively. ORX families (greater than 40% ASI) are indicated by open circles and

subfamilies (greater than 60% ASI) are indicated by open squares. The main family was arbitrarily named family 1 and subdivided in two groups of subfamilies, 1-I and 1-II , which are indicated by ovals. Group 1-II further comprises subfamilies A and B. Beside each sequence name, black dots indicate sequences derived from the use of the OR3B/OR5B

5 consensus primers, black squares those derived from the OR3.1/7.1 consensus primers, and black rectangles indicate potentially functional genes (uninterrupted ORFs). In the case of HSA 912-93 (black rectangle and double asterisk), the sequence contains only one nonsense point mutation in human, but potentially codes in other primates. See Rouquier et al. (1998) *Hum. Mol. Genet.* 7, 1337-1345. In FIG. 2, the following abbreviations are used: human,

10 HSA; chimpanzee, PTR; gorilla, GGO; orangutan, PPY; gibbon, HLA; macaque, MSY; baboon, PPA; marmoset, CJA; squirrel-monkey, SSC and SBO; lemur, EFU and ERU; zebrafish, DRE.

#### DETAILED DESCRIPTION OF THE INVENTION

15 Included in the invention are the novel nucleic acid sequences and their polypeptides. The sequences are collectively referred to as "ORX nucleic acids" or "ORX polynucleotides" and the corresponding encoded polypeptides are referred to as "ORX polypeptides" or "ORX proteins." Unless indicated otherwise, "ORX" is meant to refer to any of the novel sequences disclosed herein.

20 The ORX nucleic acids and polypeptides are described in more detail below.

#### OR1

25 LOCUS AF127814 649 bp DNA PRI 28-FEB-2000  
DEFINITION Papio hamadryas olfactory receptor (PPA13) gene, partial cds.

ACCESSION AF127814

KEYWORDS

SOURCE baboon.

ORGANISM Papio hamadryas

30 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Papio.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

35 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
     Montpellier Cedex 5 34396, France  
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                           KDFEIPHFFCELTHILQLACSDTFLNSTLIYVMTGVLGVFPLLGIIFSYSSRIASSIRK  
                           MSSSGGKEKALSTCGSHLSVVSLFYGTGIGVHFTSAVTHSSQNISVASVMYTVVTP" (SEQ ID  
                           NO:2).  
 20                 BASE COUNT    128 a    188 c    130 g    203 t  
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     121 tcctattctg ggacactac tcctgaccgt gatggccat gacccgttgc tgccgcgtcg  
     181 ccacccctcg cactataaa ccatcatgaa ccccccgcctc tgccgcctcc tggttttttg  
 25                 241 cactggctc attgggttca tgacgtccct ctcctatatt tctctgtatgaa cacaatctaac  
     301 ctctgttaaa gattttgaaa ttccacattt ttctgcgaa ctgacacata tcctccagct  
     361 ggcctgtctc gatacccttc tgaacagcac gttgatatat gttatgacgg gttgtctggg  
     421 cgttttcccc tccttggaa tcattttctc ttatccacgaa atcgcttcat ccataaggaa  
     481 gatgtccctca tctggggaa aagagaagc actttctacc tgggtctc acctctccgt  
 30                 541 cgtttttta ttatggaa caggcatgg ggtccacttc actctgcgg tgactcattc  
     601 ttcccagaac atctccgtgg ctcggatgat gtaacgggtt gttacccccc (SEQ ID NO:1).

## OR2

35                 LOCUS AF127815 642 bp DNA            PRI    28-FEB-2000  
 DEFINITION Papio hamadryas PPA14 pseudogene, partial sequence.  
 ACCESSION AF127815  
 KEYWORDS  
 SOURCE baboon.  
 40                 ORGANISM Papio hamadryas  
                           Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
                           Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
                           Papio.  
 REFERENCE 1 (bases 1 to 642)  
 45                 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
                           reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 642)  
 50                 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
     Montpellier Cedex 5 34396, France  
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        601 aagggtgcag cggcctcagt gatgtcatgtt gggtcaccc cc (SEQ ID NO:3).

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## 20 OR3

LOCUS AF127816 649 bp DNA PRI 28-FEB-2000  
DEFINITION Papio hamadryas olfactory receptor (PPA15) gene, partial cds.  
ACCESSION AF127816

25 KEYWORDS  
SOURCE baboon.  
ORGANISM Papio hamadryas  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
30 Papio.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

35 JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
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55 NO:5).

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 601 ttccccagaac atctccgtgg ctcggatgt gtacacgggtt gttacccccc (SEQ ID NO:4).

## 15 OR4

LOCUS AF127817 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Papio hamadryas olfactory receptor (PPA16) gene, partial cds.  
 ACCESSION AF127817  
 20 KEYWORDS .  
 SOURCE baboon.  
 ORGANISM Papio hamadryas  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 25 Papio.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 30 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 35 Montpellier Cedex 5 34396, France  
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 541 ggtcagctg ttcatggca cgggcctgg ggtctatctc agtctgcag ctataccat  
 601 ttcttaggaca agtctgggg cctcgtat gtacaccatg gtcacccccc (SEQ ID NO:6).

## 10 ORS

LOCUS AF127818 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Papio hamadryas olfactory receptor (PPA41) gene, partial cds.  
 ACCESSION AF127818  
 15 KEYWORDS  
 SOURCE baboon.  
 ORGANISM Papio hamadryas  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 20 Papio.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 25 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
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 50 121 tcctattctg gacacactac tcctgaccgt gatggcctat gaccgggttggccgtctg  
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481 gatgtccctca tctggggaa aagagaagg acttttacc tggcttc accttccgt  
541 cgtttctta ttatggg aaggcatgg ggtccactc acttctgggg tgacttcatc  
601 ttccagac atcccggtt cctcggtat gtacacgggtt gtacacccccc (SEQ ID NO:8).

## 5 OR6

LOCUS AF127819 649 bp DNA PRI 28-FEB-2000  
DEFINITION Papio hamadryas olfactory receptor (PPA42) gene, partial cds.  
ACCESSION AF127819  
10 KEYWORDS  
SOURCE baboon.  
ORGANISM Papio hamadryas  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
15 Papio.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
20 JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue de la Cardonille,  
25 Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
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VPSAGGRKKAFSTCSSHLSVALFYGTTIGVYLCPSSVRTAVKEKASAVMYTAVTP" (SEQ  
40 ID NO:11).  
BASE COUNT 111 a 224 c 146 g 168 t  
ORIGIN  
1 cctgggtat ttctgtctgg ccaccaacac catccccaaatgctggta gccttcaaac  
61 caggagcaag gccatctttt atccctgtt cctgacccag atgtacttcttccatttttt  
45 121 cggcatgtt gacagcatca taatcgccat gatggccat gacgggttgc tggccatctg  
181 ccacccgtt cactacgcca cgatcatgag cccacgcctt tgggtctgc tggteggcgt  
241 cccctggcg tttctgttcttccatcttccatc cccacatc ctctgtatgg cccgcctgt  
301 ttcttgccgc agccacgagg tgcctacta ctctgcgcac ctcactccca tcctccgact  
361 ttctgtgcaca gacacatcg tgaacaggat ctctccatc atttgtggcag ggatgggtat  
421 agccacgccc ttcatctgca tcctggcttc ctatgtcgc accttgcgg ccatcatgaa  
481 ggtcccccttgcaggggca ggaagaaagg ctctccacc tgcagctccc acctgtctgt  
541 ggttgcgttc ttctatggg ccaccaatgg tgcctatgt tgcctccctt cggccgcac  
601 ggctgtgaag gagaaggat ctgcgtatgttacacagca gtcacccccc (SEQ ID NO:10).

## 55 OR7

LOCUS AF127820 641 bp DNA PRI 28-FEB-2000  
 DEFINITION Papio hamadryas PPA43 pseudogene, partial sequence.  
 ACCESSION AF127820  
 5 KEYWORDS .  
 SOURCE baboon.  
 ORGANISM Papio hamadryas  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 10 Papio.  
 REFERENCE 1 (bases 1 to 641)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
     reduction of function in primates  
 15 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 641)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 20 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..641  
         /organism="Papio hamadryas"  
         /db\_xref="taxon:9557"  
 25     gene <1..>641  
         /gene="PPA43"  
         /pseudo  
 BASE COUNT 126 a 172 c 123 g 220 t  
 ORIGIN  
 30     1 ctgcctgac atcagttca cttggccat ggtccccaaag atgattgtgg acatgaatc  
    61 gcatagcaga gtcatctccc acgcggactc cttggcacag atgtctttctt ttgtcccttt  
    121 tgcatgtata gatgacatgc tcttgactgt gatggcctat aactgatttg tggccatctg  
    181 tcaccccttg cactaccagg tcatcatgaa tcctcacttc tgtagttct tagtttttgt  
    241 gctttttcg tcagctgttt ggatccccag ctgcacaattt tgattgtgtt acaaacttacc  
 35     301 tgcttcaatg atgtggaaat ctctaaattt ttctgtgacc ctctcaact tctcaatctt  
    361 agcctgtctt gacacataac atagtcgtat attttatgg taccatattt ggttttcttc  
    421 ctctctcagg gatccttttc ttttactata aaattgtttc tcaccattcc agagttcgct  
    481 ctccaggttg gaagtataaa gccttctcca cctgcagctc tcaccttca gtgttttgt  
    541 tattttatgg aacagccctt ggagggtaacc tcagttcgc tgtagttctc ccccccagga  
 40     601 agggtcagc ggcctcagtg atgtacatgg tggtcaccccc c (SEQ ID NO:12).

## OR8

LOCUS AF127821 649 bp DNA PRI 28-FEB-2000  
 45 DEFINITION Papio hamadryas olfactory receptor (PPA68) gene, partial cds.  
 ACCESSION AF127821  
 KEYWORDS .  
 SOURCE baboon.  
 ORGANISM Papio hamadryas  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
     Papio.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 55 TITLE The olfactory gene repertoire in primates and mouse: evidence for

reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 5 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
 10 /organism="Papio hamadryas"  
 /db\_xref="taxon:9557"  
 gene <1..>649  
 /gene="PPA68"  
 CDS <1..>649  
 15 /gene="PPA68"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FIDVCFVSTTVPKMLVNIQTQSRVITYAGCITQMCFFIFFAGLD  
 IFMLTVMAYDRFAICHPLHYTVMNPRCLGLVLASWIMSALNSSLQSLMVLHLSFC  
 20 ADLEIPHFFCELNQVVHLACSDTFLNDMVMYLASALLGGALSGILYSYSKIVSSIRG  
 TSSAQGKYKAFSTCASHLSVVSFYGTLLGVYFSSAATRNSHSSAAASVMYTVVTP" (SEQ  
 ID NO:14).  
 BASE COUNT 122 a 177 c 146 g 204 t  
 ORIGIN  
 25 1 cttcatagac gtctgtttg tgtccaccac tgcggcagaatgtggta acatccagac  
 61 acagagcaga gtcacactatgcaggctg catccccaaatgtctttt tcataatttt  
 121 tgccggactg gatatctta tgctgaccgt gatggctat gacaggtttg tgcccatctg  
 181 tcacccctg cactacacgg tcacatgaa ccccaggctc tgccactgc tggttctggc  
 241 gtcctggatc atgagtgc tgaattttc ttgtccaaatgttataatggat tgcacccccc  
 30 301 ctctgtgca gacttggaaa ttccccactt ttctgtgaa cttaatcagg tgccaccc  
 361 tgccctgttccatcaccttcaatgacat ggtatgtat ttgcacatcg cgctgtgg  
 421 cggctggtgcc tcctctggaa tcctttatccatctcaatgatcgttccatccatcg  
 481 aacctcgatc getcaggggaa agtacaaggc atttccacc tgcacatc acctctcggt  
 541 tgctccatitttatggta cgcccttagg agtgtactttt agttctgtcaacccgtaa  
 35 601 ctcacactca agtgetcgat cctcggtat gtacactgt gtacccccc (SEQ ID NO:13).

## OR9

LOCUS AF127822 649 bp DNA PRI 28-FEB-2000  
 40 DEFINITION Papio hamadryas olfactory receptor (PPA72) gene, partial cds.  
 ACCESSION AF127822  
 KEYWORDS  
 SOURCE baboon.  
 ORGANISM Papio hamadryas  
 45 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Papio.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 50 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 55 TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649  
 5 /organism="Papio hamadryas"  
 /db\_xref="taxon:9557"

gene <1..>649  
 10 /gene="PPA72"  
 CDS <1..>649  
 /gene="PPA72"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FIDICFVSTTVPKMLVNIQTQSRVITYAGCITQMCFIFLAGLD  
 IFMLTVMAFDRFVAICHPLHYTVMNPKLCGLLVASWIMNALNSSLQSLIVLRLSFC  
 15 TDLEIPHFFCELNQVVHLACSDTFLNDMGMYMASALLGGGALSGILYSYSKILSSIRG  
 TSSAQGKYKAFSTCASHLSVVSFYGTLLGVYFSSAATRNSHSSAAASVMYTVVTP" (SEQ

ID NO:16).

BASE COUNT 124 a 179 c 144 g 202 t

ORIGIN

20 1 cttcatagac atctgttttg tgtccaccac tgcccgaag atgctggta acatccagac  
 61 acagagcaga gtcacacat atgcaggctg catcacccag atgtgcattt tcattttt  
 121 tgccggactg gatatctta tgctgaccgt gatggcctt gaccggttt tggccatctg  
 181 tcacccctcg cactacacgg tcacatgaa ccccaagctc tggggctgc tgggtctggc  
 241 gtcctggatc atgaatgcc tgaattcctc gitacaaagc ttaatagtgc tgcggatttc  
 25 301 cttctgcaca gacttggaaa ttccccactt ttctgtgaa cttaatcagg tggccacct  
 361 tgcctgttctc gacacccatc ttaatgacat ggggatgtat atggcatctg ctctgtgg  
 421 cggtgtggcc ctctctggaa tccctttattc ttattctaag atcccttctt ccatacgtag  
 481 aacctcgatca gtcaggggaa agtacaaggc atttccacc tggcatctc acctctcggt  
 541 tgcctcttta ttatgttca cgctcttagg agtgtacttt agtgtctg caactcgtaa  
 601 ctcacactca agtgcgtcag ctcgggtat gtacacgggtt gtacacccccc (SEQ ID NO:15).

## OR10

LOCUS AF127823 649 bp DNA PRI 28-FEB-2000  
 35 DEFINITION Papio hamadryas olfactory receptor (PPA79) gene, partial cds.  
 ACCESSION AF127823  
 KEYWORDS  
 SOURCE baboon.  
 ORGANISM Papio hamadryas  
 40 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Papio.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 45 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 50 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
 55 /organism="Papio hamadryas"

gene                    /db\_xref="taxon:9557"  
 gene                    <1..>649  
 gene                    /gene="PPA79"  
 CDS                    <1..>649  
 gene                    /gene="PPA79"  
 codon\_start=2  
 product="olfactory receptor"  
 translation="LVDVSYATSIVPQLLAHFLAEHKAIISLQSCAAQLFFSLALGGIE  
 FVLLAVMAYDRYVAVCDPLRYSATMHGALCAKLAITSWVSGSINSLMHTTITFQLPMC  
 TNKFINHIFCEILAVRLACVDTSSNEVTIMVSSIVLLMTPLCLVLLSYIRIISTILK  
 IQSREGRRKAFHTCASHLTVALCYGMAIFTYIHPHSSPSVLQEKLISLFYAILTP" (SEQ ID  
 NO:18).  
 BASE COUNT    135 a   185 c   133 g   196 t  
 ORIGIN  
 15                    1 ccttgcgt gtccctatg ccacaagcat agtccctcag ctggcgttgc acatttttc  
 61                    61 agaacataaa gccatctcg tgcagagctg tgccggccaa ttattttctt ccctggcctt  
 121                   121 gggtggtt gagggttc tcctggcagt gatggctat gaccgctatg tggctgttg  
 181                   181 tgacccctcg cgatactcg ccacatgca tggagcgcta tggctaaatg tggccatcac  
 241                   241 atcctgggtc agtggatcca ttaactctt catgcatacc accatcaccc tttagctgc  
 20                    301 catgtgcaca aacaagttttaatcatat attctgtgaa attctagctg tgatcgat  
 361                   361 ggcttgtgtg gacacctctt ccaacgggtt caccatcatg gtgtctagca ttgttctt  
 421                   421 gatgacaccc ttatgtctgg ttctttgtc ttacatccgg atcatctcca ccacatctaaa  
 481                   481 gatccagttcc agagaaggaa ggagggaaagc ctccacacg tggctctc acctcacatg  
 541                   541 ggtgccctg tgctatggca tggccattt cacttacatc catccccact ccagccctc  
 25                    601 tgccttcag gagaagttga tctctctt ttatgcccattt ttgacacca (SEQ ID NO:17).

## OR11

LOCUS                AF127824    649 bp   DNA            PRI    28-FEB-2000  
 30                    DEFINITION Pan troglodytes olfactory receptor (PTR12) gene, partial cds.  
 ACCESSION            AF127824  
 KEYWORDS  
 SOURCE               chimpanzee.  
 ORGANISM            Pan troglodytes  
 35                    Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 REFERENCE           1 (bases 1 to 649)  
 AUTHORS             Giorgi,D.G. and Rouquier,S.P.  
 TITLE                The olfactory gene repertoire in primates and mouse: evidence for  
 40                    reduction of function in primates  
 JOURNAL             Unpublished  
 REFERENCE           2 (bases 1 to 649)  
 AUTHORS             Giorgi,D.G. and Rouquier,S.P.  
 TITLE                Direct Submission  
 45                    JOURNAL           Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue de la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES            Location/Qualifiers  
 source              1..649  
 50                    /organism="Pan troglodytes"  
 /db\_xref="taxon:9598"  
 gene                <1..>649  
 gene                /gene="PTR12"  
 CDS                <1..>649  
 gene                /gene="PTR12"  
 codon\_start=2

/product="olfactory receptor"  
 /translation="FLEIGFNLVIVPKMLGTLLAQDTTISFLGCATQMYFFFFFGVAE  
 CFLLATVAYDRYVAICSPHLHYPVIMNQRTRAKLAAASWFPGPVATVQTTWLFSFPFC  
 RTNKVNHFCDSPPLRLVCADTALFEIYAVGTLVVMIPCLLILCSYTRIAAILK  
 IPSAKGKNKAFSTRSSHLLVSLFYISLSLTYFRPKSNNNSPEGKKLLSLSYTVMTP" (SEQ ID  
 5 NO:20).  
 BASE COUNT 132 a 193 c 129 g 195 t  
 ORIGIN  
 1 tttcctggag attggcttca acctagtcat tgtgccaaa atgctggga ccctgcttgc  
 61 ccaggacaca accatcttc tccctggctg tgccactcg atgtattct tcttttctt  
 121 tggagttgtc gaatgttcc tccctggctac cgtggcatat gaccgctatg tggccatctg  
 181 cagtcccttg cactaccccg tcacatgaa ccaaggaca cgggccaac tggctgtc  
 241 ctccctggttc ccaggcttc ctgttagctac tgcagacc acatggctct ctagtttcc  
 301 attctgtcgc accaacaagg tgaaccactt ctctgtgac agccccacccgt tgctgaggct  
 361 ggctgtgca gacacagcac tggatgttgc ctacgccatc tgccggatca ttctgggtgg  
 421 catgatcccc tgctgtgca tcttgtgttc ctatactcgc attgctgtcg ccacccctcaa  
 481 gatcccatca gctaaaggaa agaataaaagc cttttctaca cgttccac acctccctgt  
 541 tgctctctt ttctatatacat cattaaggct cacatattt cggccctaaat caaaataattc  
 601 tcctgaggc aagaagctgc tatcgtgtc ctacactgtt atgactccc (SEQ ID NO:19).  
 20

## OR12

LOCUS AF127825 650 bp DNA PRI 28-FEB-2000  
 DEFINITION Pan troglodytes PTR2 pseudogene, partial sequence.  
 25 ACCESSION AF127825  
 KEYWORDS  
 SOURCE chimpanzee.  
 ORGANISM Pan troglodytes  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 30 Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 REFERENCE 1 (bases 1 to 650)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 35 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 650)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 40 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..650  
 /organism="Pan troglodytes"  
 /db\_xref="taxon:9598"  
 45 gene <1..>650  
 /gene="PTR2"  
 /pseudo  
 BASE COUNT 127 a 202 c 131 g 190 t  
 ORIGIN  
 50 1 ctttgtggac atctgttctt cttccaccac cgtccccaaag atgctggca atcacatact  
 61 cgggactcg accatcttc tctgtggctg ttccacacag atgtatttcg ttttcatgt  
 121 tggacatg gacaattcc tccctgtatgatggctat gaccgcttgc tgccgtgt  
 181 ccacccctta cattacacag caaagatgac ccatcagtc tgcgttgc tgggtgttgg  
 241 attatgggtt gttgccaacc tgaatgttctt tgcacacc ctgtgtatgg ctgcacttc  
 301 attctgtgca gacaatgcca tccctcaactt ctctgtcgat gtgactcccc tactgaaact

361 ccctgtca gacacacacc tcaatgaggtaataatccctt agtgagggtgcctggcata  
421 gatcacccca ttctttgcatactggc tcctggc tcctggc atcacctgca ctgtcctgag  
481 ggtcccatcc acaaaggaa ggtggtaa gtcctccacc tggtggcttc acctggctgt  
541 ggttctacct ctctatggc accatcatggc ctgtgttta taaccctctg tcctccact  
601 cagcagagaa agacactacg gctactgtgtt tgatatacagt agtactccc (SEQ ID NO:21).

OR13

LOCUS AF127826 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Pan troglodytes PTR3 pseudogene, partial sequence.  
 ACCESSION AF127826  
 KEYWORDS  
 SOURCE chimpanzee.  
 ORGANISM Pan troglodytes  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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     /organism="Pan troglodytes"  
     /db\_xref="taxon:9598"  
 gene <1..>649  
     /gene="PTR3"  
     /pseudo  
 BASE COUNT 146 a 166 c 121 g 216 t  
 ORIGIN  
     1 ctttgttgat ttctgttatt ccaccacagt tacacccaaa ctgctggaga acttggtgt  
     61 ggaagacaga accatctct tcacaggatg catcatgea ttcttcctgg cgtgtatatg  
     121 tgcagttggca gaaacattca tgctggcagt gatggcctat gattgatacg tggcagtgt  
     181 taaccttcttgcctcacacag ttgcaggc ccagaaac tc tgfcatcat tagtggcagg  
     241 gcccatacaca tggggataa tctcttcct gacactcacc tatttcctct tgcatttgc  
     301 ctctgtggg tctaacatca tcaataattt tgctgttgag gactctgtca tcatctctg  
     361 ctccctgcctt gacccttaca tcagccaaat gctttgtt gtcatggcaa tattcaatga  
     421 ggttgcggc acggggatca tcctcaact ctatatttc atctttatgg ctgtcataaa  
     481 aatggcttctt gctgtgggc accaaaaaaggc ttctctacc tggtgtcc acctgactgc  
     541 catcaactt ttccatggga ctgtcctgtt cttttatgt gtacccaaact cccaaaaactc  
     601 atggctcata gtccaaatggtag gttctgtgtt ttatcaggc atcatcccc (SEQ ID NO:22).

OR14

50 LOCUS AF127827 651 bp DNA PRI 28-FEB-2000  
DEFINITION Pan troglodytes PTR4 pseudogene, partial sequence.  
ACCESSION AF127827  
KEYWORDS .  
55 SOURCE chimpanzee.  
ORGANISM Pan troglodytes

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 REFERENCE 1 (bases 1 to 651)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 5 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 651)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 10 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..651  
 15 /organism="Pan troglodytes"  
 /db\_xref="taxon:9598"  
 gene <1..>651  
 /gene="PTR4"  
 /pseudo  
 20 BASE COUNT 131 a 166 c 134 g 220 t  
 ORIGIN  
 1 cttgtctgac atcggttca cctccaccac ggtccccaag atgattggg acatccagtc  
 61 tcacagcaga gtcatctct atgcaggctg cctgactcg atgtctctt ttgcatttt  
 121 tggaggtatg gaagagagac atgcctcgta gigtgatggc ctatgaccgg ttttagccca  
 25 181 tctgtcacct atatcgatca gccatctta acccggttt ctgtggcttc cttagtttg  
 241 tgcctttttt tttttttcaga gtcattttcaga ctcccgatgtg cacaacttgc ttgccttaca  
 301 aatgacccgtt tcgaaggatg tggaaattcc taatttcttc tggaaacctt ctaactctc  
 361 ccatctgca tggttgaca cttcacccag gaacatcgat attccctgc tgccatattt  
 421 ggtttcttc ctatctcaca gatcatttc tcttactata aaattgtttc ctccatgtg  
 481 agttttcat catcaggatgg gaagtataaa gcttctca actgtgggtc tccccgtca  
 541 gtgtttgtc tattttatgg gaaaggcatt ggggggtacc tgagttcaga tggtcatct  
 601 tcccccagaa agggtgcagt ggcctcagtg atgtacacgg tgatcacccgc c (SEQ ID NO:23).

## OR15

35 LOCUS AF127828 657 bp DNA PRI 28-FEB-2000  
 DEFINITION Pan troglodytes PTR5 pseudogene, partial sequence.  
 ACCESSION AF127828  
 KEYWORDS  
 40 SOURCE chimpanzee.  
 ORGANISM Pan troglodytes  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 REFERENCE 1 (bases 1 to 657)  
 45 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 657)  
 50 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 55 source 1..657

20 OR16

LOCUS AF127829 657 bp DNA PRI 28-FEB-2000  
 DEFINITION Pan troglodytes PTR6 pseudogene, partial sequence.  
 ACCESSION AF127829  
 25 KEYWORDS .  
 SOURCE chimpanzee.  
 ORGANISM Pan troglodytes  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 30 REFERENCE 1 (bases 1 to 657)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE The olfactory gene repertoire in primates and mouse: evidence for  
         reduction of function in primates  
 35 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 657)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE Direct Submission  
     JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
         Montpellier Cedex 5 34396, France  
 40 FEATURES Location/Qualifiers  
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         /db\_xref="taxon:9598"  
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         /gene="PTR6"  
         /pseudo  
 45 BASE COUNT 133 a 171 c 131 g 222 t  
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     1 ctgcgttac atcagttca cctccatcac agtccccaaag atgattgtgg acatctagtc  
     61 tcacagcaga gtcatctgtc atgcagggtg cctgactcgatgtctctt ttgcatttt  
     121 tggaggcatg gaagagagac atgcctctga atgtgtatggc ctatgtccgg ttgttagcca  
     181 tctgtcaccc tctatatacat tcagccatca tgaacccgtg ttctgtggc ttccacttt  
     241 tggatgtttt ttttttttc gcggctttt agatgcccgat cttgcacaaca tgattgcctt  
     301 acaaacgacc tgcttcaagg atgtggaaat tcctaatttc ttctgttgatc ctttcaact  
     361 accccaccc ttgtatgtgc acacccatcac caataaacatc atcatgtttt tccctgtgc

421 cctatttgg ttcctccca tctcgccccac cctttctct tactgtaaaa ttgtttccctc  
481 cattctgagg gtttcatcat caggtggaa gtataaacct tctccacctg tgggtctcac  
541 ctgtcagg tttgctgatt ttatggaaaa ggcgttggag ggtacccag ttcatgttg  
601 tcatctccc tgagaaggc tgcatgttcc tcagtatgt acaagatgt cactccc (SEQ ID NO:25).

5

## OR17

LOCUS AF127830 650 bp DNA PRI 28-FEB-2000

DEFINITION Pan troglodytes PTR7 pseudogene, partial sequence.

ACCESSION AF127830

KEYWORDS .

SOURCE chimpanzee.

ORGANISM Pan troglodytes

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.

REFERENCE 1 (bases 1 to 650)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates

20 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 650)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

25 FEATURES Location/Qualifiers

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/db\_xref="taxon:9598"  
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BASE COUNT 122 a 168 c 127 g 233 t

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61 tcacagtaga ctcatctttt acgttaggtgc cctgactcag atgtctttt tgatccctt  
121 cgcatgtatg gaaagtctgc tccctgattgt gatggctat gaccggctcg tgaccatctg  
181 tcacccctcg cactaccaag tcatcatgag cccacgactc tggcttct tagtttgg  
241 gctttttttt cttagccctt tggactctca gctgcacaat ttgattgtgt tacaacttac  
40 301 ctgcctcaac gatgttagaaa tctctaattt ttctgtga ccctcttaa ctctcaacc  
361 tggccgttcc tgacacccctt attaataaca tgggtata tttatggg gecatatttg  
421 gttttctccc tctcttaggg atccctttctt cttaataaa aatgtttcc tccatctga  
481 gagttctctc ttcaagggtggg aagtataaag cttctccac ctgcagctt cacccgtcag  
541 ttgtttgtttt attttatggaa acagcccttg gagggtacct cagtttgcgt gtgtccctt  
45 601 cctccaggaa gggtcagtg gcctcagtg tgtatgtt ggtcacccttcc (SEQ ID NO:26).

## OR18

LOCUS AF127831 663 bp DNA PRI 28-FEB-2000

50 DEFINITION Pan troglodytes PTR8 pseudogene, partial sequence.

ACCESSION AF127831

KEYWORDS .

SOURCE chimpanzee.

ORGANISM Pan troglodytes

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 REFERENCE 1 (bases 1 to 663)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 5 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 663)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 10 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
     Montpellier Cedex 5 34396, France  
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     61 tcacagcaga gtcattccat atgcaggctg cctgactcg atgtctctt ttgccatttt  
     121 tggaggcatg gaagagagac atgccttga atgtgacggc ctatgacggg tttagcca  
     181 tctgtcaccc tctatatacg tcaagccatct tgaacccgtt ttctgtggc ttcttaggtt  
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     361 tcaactcccc catcttgcac gtttgacac cttcaactgg aacatcaaca tgtattttct  
     421 tgctgccata ttggtttc ttccatctc ggggaccctt ttctttact gtaaaattgt  
     481 ttccctccatt ctgagggttt catcatcagg tgggaagtat aaacccatc cacttgtgg  
 30     541 tctcacccgt cagtttttg ctgattttat ggaacaggcg ttggaggta cctcggta  
     601 gatgtgtcat ctcccccag aaagggtca gtggccatcg tgatgtacac gttggtcacc  
     661 ccc (SEQ ID NO:27).

## OR19

35 LOCUS AF127832 677 bp DNA PRI 28-FEB-2000  
 DEFINITION Pan troglodytes PTR9 pseudogene, partial sequence.  
 ACCESSION AF127832  
 KEYWORDS  
 40 SOURCE chimpanzee.  
 ORGANISM Pan troglodytes  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 REFERENCE 1 (bases 1 to 677)  
 45 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
     reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 677)  
 50 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
     Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 55 source 1..677

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 5 BASE COUNT 129 a 170 c 143 g 235 t  
 ORIGIN  
 1 ctggactgac atcggttca cctccatcac agtccccaaag atgattgtgg acatctagtc  
 61 tcacagcaga gicatctgt atgcagggtg cctgactcg atgtctctt ttgcatttt  
 10 121 tggaggcatg gaagagagac atgcctcta gtgtgatggc ctatggccgg ttgttagcca  
 181 tctgtcaccc tccatactgt tcagecattt tgaaccctgt ttctgtggc ttccataggatt  
 241 tgggtcctt gttttttttt gttttgtttt gttttttctt caggcttttta gactcccage  
 301 tgcacaacctt gattgcctta caaatgacgt gttcaagga tggaaattt cctaatttct  
 361 tctggaaacc ttctcaactc gcccatactt catgtgtaa cacccacc accaaatata  
 15 421 acctgtattt ccctgtcgcc gtatgggtt ttctccat ctgggggacc ctttcttt  
 481 actgtaaaaat tgttccctcc attctgaagg ttcatcattt aggtggaaac tataaaggct  
 541 tctccacctg tgggtctcac ctgtcagtgtt ttgcattttt ttatggaaaca ggcgtggag  
 601 ggtacatcgatgtt tcatctccccc ccagaaagggtt tgcagtggcc tcagtatgt  
 661 acacgggtgtt caccctt (SEQ ID NO:28).  
 20

## OR20

LOCUS AF127833 643 bp DNA PRI 28-FEB-2000  
 DEFINITION Hylobates lar HLA45 pseudogene, partial sequence.  
 25 ACCESSION AF127833  
 KEYWORDS  
 SOURCE common gibbon.  
 ORGANISM Hylobates lar  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 30 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
 REFERENCE 1 (bases 1 to 643)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 35 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 643)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 40 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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 45 gene <1..>643  
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 BASE COUNT 131 a 168 c 127 g 217 t  
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 61 gcatagcaga gccatctttt atgcaggctg cctgacacag atgtctttt ttgtctttt  
 121 gcatgtatag aagacatgtt cctgactctg atggctatgtt accgattttt ggccatctgt  
 181 cacccctgc actacccactt catcgtaat cctcaccctt gtgtctttt agtttttgt  
 241 tctttttcc tttagctgtt ggattcccaag ctacacagctt ggttgggtt tacaattcac  
 55 301 ctcttcaag aatggaaatc tctaaattttt tctgtgaccc gtcctcaactt ctcaaccctt

361 cctgttctga cagcatcatc gataacatat tatataattta gatagcccta tattttgttt  
421 tcctccatt tcagggatcc ttttgtctta gtataaaatt gtctccccca ttccgagaat  
481 tccatcatca gatggaaagt ataaaggctt ctccacctgt ggctctacc tggcagttgt  
541 tgcattttat gaaacaggca ttggcggtga cctgacttca gctgtgtcat catccccag  
601 gaatggtgtg gtggcgtag tgatgtatgc tgtggtcacc ccc (SEQ ID NO:29).

## OR21

LOCUS AF127834 648 bp DNA PRI 28-FEB-2000  
10 DEFINITION Hylobates lar HLA46 pseudogene, partial sequence.  
ACCESSION AF127834  
KEYWORDS  
SOURCE common gibbon.  
ORGANISM Hylobates lar  
15 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
REFERENCE 1 (bases 1 to 648)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
20 reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 648)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
25 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
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30 /db\_xref="taxon:9580"  
gene <1..>648  
/gene="HLA46"  
/pseudo  
BASE COUNT 131 a 170 c 143 g 204 t  
35 ORIGIN  
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121 tggggattt gaaaatggaa ttctggcat gatggctat gatcgatttggccatctg  
181 tcacccactg aggtacaatg tcacatgaa cccaaactctt gttggctgtcttgc  
40 241 tccttcatca ttatgttctt ggacgctctg ctgcacacgt tgatgggtctt acggctgacc  
301 tctgcacag acctggaaat tccccactttt ttcgtgttacatgt tctcaagctc  
361 gcctgttctg atgttctat taataacatc ctgggttattt tggtgaccgg cctgttaggt  
421 gttgttccctc actctggat cattttctt tacacacgaa ttgccttc tgcataaaaa  
481 attccattag ctggtgaaat gtataaagct tttccatctt ggggtcaca cttaatcgtc  
45 541 gtttgcitgt tctatggaaac agggtttggg gtttacccttta gttctggggc taccctactcc  
601 tcttaggcagg tgcaatagc atcagtatgc tataccgtgg tcacccccc (SEQ ID NO:30).

## OR22

LOCUS AF127835 660 bp DNA PRI 28-FEB-2000  
50 DEFINITION Hylobates lar HLA47 pseudogene, partial sequence.  
ACCESSION AF127835  
KEYWORDS  
SOURCE common gibbon.  
ORGANISM Hylobates lar

OR23

35 LOCUS AF127836 649 bp DNA PRI 28-FEB-2000  
DEFINITION Hylobates lar olfactory receptor (HLA48) gene, partial cds.  
ACCESSION AF127836  
KEYWORDS .  
40 SOURCE common gibbon.  
ORGANISM Hylobates lar  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
45 REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
50 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
55 source 1..649

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                KDFEIPHFFCELTHILQLARSDTFLNSTLIYFMTGVLGVFPLLGIIFSYSRIASSIRK
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ID NO:33).
BASE COUNT    133 a   190 c   124 g   202 t
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61      caagaacaaaa gccatctcct acatggact cctcacacag gtctatttct ccatgctttt
121     tcctattctg gacacgtac tcctgaccgt gatggctat gaccggtttg tgccatctg
181     ccacctctcg cactacatgat tcacatcatgaa ccccccgcctc tggcctcc tgattttgt
20      241 catctggctc attgggtgtca tgacatccct cctccatatt tctctgtatga tgcatctaatt
301     ctctgtaaa gattttgaaa ttccacattt ttctgcgaa ctgacacacaca tccctccagct
361     gccccgctct gatacccttc tgaacagac gttgatatac ttatgacag gttgtctgggg
421     cggtttcccttcccttgcgaa tcattttctc ttatcgcgaa attgtctcat ccataaggaa
481     gatgtcctca tctgggggaa aacaaaaagc actttccacc tggggcttc acctctccgt
25      541 tgtttctta ttatggaa caggcattgg ggtccacttc actctgcag tgactcacgc
601     ttcccaaaaaa atctccgtgg cctcggtat gtacacttg gtcacccccc (SEQ ID NO:32).

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#### OR24

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30      LOCUS AF127837 649 bp DNA      PRI 28-FEB-2000
DEFINITION Hylobates lar olfactory receptor (HLA5) gene, partial cds.
ACCESSION AF127837
KEYWORDS .
35      SOURCE common gibbon.
ORGANISM Hylobates lar
        Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
        Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.
REFERENCE 1 (bases 1 to 649)
AUTHORS Giorgi,D.G. and Rouquier,S.P.
40      TITLE The olfactory gene repertoire in primates and mouse: evidence for
        reduction of function in primates
JOURNAL Unpublished
REFERENCE 2 (bases 1 to 649)
AUTHORS Giorgi,D.G. and Rouquier,S.P.
45      TITLE Direct Submission
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,
        Montpellier Cedex 5 34396, France
FEATURES Location/Qualifiers
source      1..649
50      /organism="Hylobates lar"
                /db_xref="taxon:9580"
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        CDS      <1..>649
                /gene="HLA5"

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 5 KDFEIPHFFCELTHILQLACSDTFLNSTLIYFMTGVLGVFPLLGIIIFSYSRIASSIRK  
 MSSSGGKQKALSTCGSHLSVVSFYGTGIGVHFTSAVTHASQKISVASVMYTVVTP" (SEQ  
 ID NO:35).  
 BASE COUNT 133 a 189 c 124 g 203 t  
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 61 caagaacaaa gecatctc acatggactc ctcacacag gtctatttc ccatgttt  
 121 tcctattctg gacacgttac tccttgaccgt gatggcttat gaccggtttggccatctg  
 181 cttccctctg cactatcgatca tcatcatgaa ccccccgtc tttggctcc tgattttgt  
 241 catctggctc attgggttca tgacatccct cctccatatt tctctgtatgc tgcataat  
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 421 cgttttccc ctccttggga tcattttctc ttatcagca attgctcat ccataaggaa  
 481 gatgttctca tctggggggaa aacaaaaagc actttccacc tttgggttc acctctccgt  
 541 tgggtttta ttatggga caggcattgg ggtccacttc acttctgcag tgactcacgc  
 20 601 ttccagaaaa atctccgttgc ctcgggtat gtacacgggt gtcacccccc (SEQ ID NO:34).

## OR25

LOCUS AF127838 651 bp DNA PRI 28-FEB-2000  
 25 DEFINITION Hylobates lar HLA6 pseudogene, partial sequence.  
 ACCESSION AF127838  
 KEYWORDS  
 SOURCE common gibbon.  
 ORGANISM Hylobates lar  
 30 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
 REFERENCE 1 (bases 1 to 651)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 35 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 651)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 40 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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 121 tggaggcatg gaagagagac atgccttgc gttgtatggc ctatgacagg ttgttagcca  
 181 tctgtcacccttctatcat tcagccatca tgaacccgtt ttctgtggc ttcttagtgc  
 55 241 tctttttt ctctcgttctt tagaggcc cagctgcata acttgcattgc ctgtcaatg

301 acctgttca aggatgtgga aattccataa ttccctgtgc acccttctca actccggcat  
 361 ctgcatgtt gtgacatctt caccataaac ataatcatgt attttccatgc tgccgtatTTT  
 421 gggttccccc ccatactcggg gacccttttc tcttaactata aatgggttc ctcattctg  
 481 aggctttcat cgtcagggtgg gaagtataaa gccttctcca cctgtgggtc tcacccgtca  
 541 gtgttgttgcg gagtttatgg aagaggcggtt ggagggttacc tcagttcaga tgtgtccctt  
 601 tccccccagaa agtttgcagt ggcctcgtt atgtacacgg tggtcacccc c (SEQ ID NO:36).

OR26

10 LOCUS AF127839 644 bp DNA PRI 28-FEB-2000  
 DEFINITION Hylobates lar HLA7 pseudogene, partial sequence.  
 ACCESSION AF127839  
 KEYWORDS .  
 SOURCE common gibbon.  
 15 ORGANISM Hylobates lar  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
 REFERENCE 1 (bases 1 to 644)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 20 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
     reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 644)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 25 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue de la Cardonille,  
     Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 30 source 1..644  
     /organism="Hylobates lar"  
     /db\_xref="taxon:9580"  
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     121 tgcatgtat gaagacatgc tcctgactt gatggcttat gaccgatttg tggeccatctg  
 40 181 tcacccctgt cactacccag tcatcgaa tcctcaccc ttttttttttttttttttttttttttt  
     241 gtcttttttc tttagccctgt tggatcccc gtcacacagg tggatgttgtt ttacaatcca  
     301 ccttcattaa gaatggaaat ctctaattttt ttctgtgacc cgctcaact tctcaaccctt  
     361 gctgttctg acagcatcat cgataacata ttatataattt agatagccctt atatttttttttt  
     421 ttcttccat tttagggatc cttttgttctt agtataaaaat ttttttttttttttttttttttttt  
     481 ttccatcgtc agatggaaag tataaagcc ttttttttttttttttttttttttttttttttttt  
     541 ttgcattttt taaaacccggc att  
     601 gaaatgggtt ggtggcgctca gtgtatgtatc ctgtggtcac cccc (SEQ ID NO:37).

OR27

50 LOCUS AF127840 649 bp DNA PRI 28-FEB-2000  
DEFINITION Hylobates lar olfactory receptor (HLA74) gene, partial cds.  
ACCESSION AF127840  
KEYWORDS  
55 SOURCE common gibbon.

**ORGANISM** Hylobates lar  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
**REFERENCE** 1 (bases 1 to 649)  
 5 **AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
**TITLE** The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
**JOURNAL** Unpublished  
**REFERENCE** 2 (bases 1 to 649)  
 10 **AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
**TITLE** Direct Submission  
**JOURNAL** Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
**FEATURES** Location/Qualifiers  
 15 **source** 1..649  
     /organism="Hylobates lar"  
     /db\_xref="taxon:9580"  
     **gene** <1..>649  
     /gene="HLA74"  
 20 **CDS** <1..>649  
     /gene="HLA74"  
     /codon\_start=2  
     /product="olfactory receptor"  
     /translation="FVDFCYSTTITPKLLENLVVEYRTISFTGCIMQFFLVCIFVGTE  
 25     TFMLAVMAYDRCVAVCNPLLYTVAMSQRQLCSLLVATSYSWGIVCFLTLYFLLELSFR  
     GNIIINNFVCCEAAIAVSCSDPYVSQEITLVSATFNEISSLMMIFTSYAFIFITVMK  
     MPSTGGRKKAFSTCASHLTAITIFHGTLFLYCVPNSKSSWLMVKVTSVFYTVFIP" (SEQ ID  
     NO:39).  
 30 **BASE COUNT** 142 a 157 c 129 g 221 t  
**ORIGIN**  
     1 cttagtttat ttctgttatt ctactacgt tacacccaaa ctgtggaga acttgggtt  
     61 ggaatataga actatttcct tcacaggatg catcatgcaa ttctccttg tctgcataatt  
     121 ttagggaca gaaacatca tgctggcagt gatggcctat gaccgatgt tgccgggttg  
     181 taacccttt ctctacacag ttgcaatgtc ccagaggct tgctccttg tggcgctac  
 35     241 atcatactct tggggatag tctgttccct gacacttacc tactttcac tggattatc  
     301 ctcagagga aataatatca ttaataactt tgtctgttag catgctgcca ttgttgctgt  
     361 gtcttgcct gaccctatg tgagccagga gatcactta gtttctgcca cattcaatga  
     421 aataaggcgt ctgatgtat tttcacttc ctatgcattc atttttatca ctgtcatgaa  
     481 gatgcctcc actggggggc gcaagaaagc gttctccacg tttgcctccc acctgaccgc  
 40     541 cattaccatt ttccatggga ctatccattt cctctactgt gttcctaact cccaaaggatc  
     601 atggcgtatg gtcaggatgt cctctgtttt ttacacagtgt ttcatcccc (SEQ ID NO:38).

## OR28

45 **LOCUS** AF127841 659 bp DNA PRI 28-FEB-2000  
**DEFINITION** Hylobates lar HLA75 pseudogene, partial sequence.  
**ACCESSION** AF127841  
**KEYWORDS** .  
 50 **SOURCE** common gibbon.  
**ORGANISM** Hylobates lar  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
**REFERENCE** 1 (bases 1 to 659)  
 55 **AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
**TITLE** The olfactory gene repertoire in primates and mouse: evidence for

OR29

30 LOCUS AF127842 662 bp DNA PRI 28-FEB-2000  
 DEFINITION Hylobates lar HLA8 pseudogene, partial sequence.  
 ACCESSION AF127842  
 KEYWORDS .  
 35 SOURCE common gibbon.  
 ORGANISM Hylobates lar  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
 REFERENCE 1 (bases 1 to 662)  
 40 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
     reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 662)  
 45 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue de la Cardonille,  
     Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 50 source 1..662  
     /organism="Hylobates lar"  
     /db\_xref="taxon:9580"  
 gene <1..>662  
     /gene="HLA8"  
     /pseudo  
 55

OR30

LOCUS AF127843 662 bp DNA PRI 28-FEB-2000  
 DEFINITION Gorilla gorilla GGO1 pseudogene, partial sequence.  
 ACCESSION AF127843  
 KEYWORDS .  
 SOURCE gorilla.  
 ORGANISM Gorilla gorilla  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
 REFERENCE 1 (bases 1 to 662)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 662)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
     Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..662  
         /organism="Gorilla gorilla"  
         /db\_xref="taxon:9593"  
     gene <1..>662  
         /gene="GGO1"  
         /pseudo  
 BASE COUNT 127 a 180 c 135 g 220 t  
 ORIGIN  
     1 ctggactgac atcggttca cctccaccac agtccccaag atgattgtgg acatccaggc  
     61 tcacagcaga gccatctct atgcacgctg cctgacttcg atgtctctt ttgcatttt  
     121 tggaggcatg gaagagagac atgtcttga gtgtgtatggc ctatgaccgg ttttagccaa  
     181 tctgtcaccc tctgtatcg ccagccatct tgaacccctgt ttctgtggc ttcttagatt  
     241 ctttgtccctt gttttttttt ttttttttc agtcttttag actcccaagct gcacaacttg  
     301 attgccttac aaaatgacatcg ctccatggat gtggaaatttc ctaattttttt ctggaaacct  
     361 tctcaactcc cccatcttcg atgttgtgac accttcacca ggaacatcaa cttgtatttc  
     421 ctttgtccca tattttttttt tcttccatccatc tcggggaccc tttttttttt ctataaaaatt  
     481 gtttcttca ttcgttgggtt ttcatcgatgtt gggaaatata aacccatcc cttgtgggtt  
     541 ctccatcgatgttgggtt tgatgtttatg gaacaggcgt tggagggtac ctccgttcc  
     601 atgtgtcatc ttccccgaga aagggtgcgt tggccctcgt gatgtacacg gtggtcaccc

661 cc (SEQ ID NO:42).

### OR31

5 LOCUS AF127844 650 bp DNA PRI 28-FEB-2000  
DEFINITION Gorilla gorilla GGO17 pseudogene, partial sequence.  
ACCESSION AF127844  
KEYWORDS  
SOURCE gorilla.  
10 ORGANISM Gorilla gorilla  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
REFERENCE 1 (bases 1 to 650)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
15 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 650)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..650  
25 /organism="Gorilla gorilla"  
/db\_xref="taxon:9593"  
gene <1..>650  
/gene="GGO17"  
/pseudo  
30 BASE COUNT 129 a 170 c 137 g 214 t  
ORIGIN  
1 ttttgctgac ctctgttta cctccacgac tgcccaaag atgtactga atatactgac  
61 acagaacaaa ttccataacat atgcaggctg ttcggcgtat atttttttt ttcacttcat  
121 ttggatgcct ggacaattta ctcttgactg tgatggctca tgaccgcttc gtggccatct  
181 gtcacccct gcactatacg gtcatcatgaa acccccggct ctgtggactg ctgggtctgg  
241 ggtcctgggt catcagtgtc atgggttccc tgctcgagac ctgtactgtt ttgaggctgt  
301 cttctgcac caaatggaa attcacact ttttttgta tctcttgaa gtcctgaagc  
361 tcgcctgttc tgacacccctt attaataacg tggatgatata ctttgcactt ggcgtctgg  
421 gtgtgattcc cttcaactggaa atattttctt cttactataaa aatgttttc tctatactga  
481 ggatttcctc agctgggaga aagcacaagg cgtttccac ctgtggcc cacctcttag  
541 tggtcacctt gttctatggc acgggtttt gggctatct cagttctgca gccacaccaat  
601 ctcttagggc aagtctggc gcctcgtga tgtacaccat ggtcaccccc (SEQ ID NO:43).

### OR32

45 LOCUS AF127845 649 bp DNA PRI 28-FEB-2000  
DEFINITION Gorilla gorilla olfactory receptor (GGO18) gene, partial cds.  
ACCESSION AF127845  
KEYWORDS  
SOURCE gorilla.  
ORGANISM Gorilla gorilla  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
REFERENCE 1 (bases 1 to 649)  
55 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 5 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 10 source 1..649  
     /organism="Gorilla gorilla"  
     /db\_xref="taxon:9593"  
     gene <1..>649  
     /gene="GGO18"  
 15 CDS <1..>649  
     /gene="GGO18"  
     /codon\_start=2  
     /product="olfactory receptor"  
     /translation="FVDICFVSTTVPKMLVNIQTHNKVITYAGCITQMCFLFVG  
 20 LD NFLLTVMAYDRFAICHPLHYMIVMNPQLCGLLVLASWIVGVLSMLQSLMVLPLPFC  
     THMEIPHFFCEINQVVHLACSDTFLNDIVMYFAVALLGGGPLNGILYSYSKIVSSIRA  
     ISSAQGKYKAFSTCASHLSVVSFYGTCLGVYLSSAATHNSHTGAAASVMYTVVTP" (SEQ  
 ID NO:45).  
 25 BASE COUNT 136 a 172 c 134 g 207 t  
 ORIGIN  
     1 ctccgttagac atctgttttg tctcttaccac tgcccgaaag atgctggta acatccagac  
     61 acacaacaaa gtcacactt atgcaggctg catcacccag atgtgccttt tcttactctt  
     121 tggaggatggataacttcc ttctgaccgt gatggcttat gaccggtttg tgccatctg  
     181 tcacctctgt cactacatgg tcattatgaa cctcaactc tgtggactgc tggttctggc  
 30 241 gtccctggatc ggggttgttca taaatccat ttacaaagc ttaatggtgt tgccactgcc  
     301 cttttgtaca cacatggaaa tccctcattt ttctgtgaa attaatcagg tgccac  
     361 tgccgttctt gacacccttc ttaatgacat agtgatgtat ttgcagtag cactgctgg  
     421 cggtggtccc ctcaatggga ttctgtactc ttactctaag atagttccct ccatacgtgc  
     481 aatctcatca gctcaggaga agtataaggc atttccacc tgcacttc acctctcagt  
     541 tgccttcata ttatggta catgcttgg ggtgtacctt agtctgtg caacccacaa  
     601 ttcacacaca ggtgctgcag ctcactgtat gtacactgtg gtcacccccc (SEQ ID NO:44).

### OR33

40 LOCUS AF127846 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Gorilla gorilla olfactory receptor (GGO19) gene, partial cds.  
 ACCESSION AF127846  
 KEYWORDS  
 SOURCE gorilla.  
 45 ORGANISM Gorilla gorilla  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 50 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
     reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 55 TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
 5 /organism="Gorilla gorilla"  
 /db\_xref="taxon:9593"  
 gene <1..>649  
 /gene="GGO19"  
 CDS <1..>649  
 10 /gene="GGO19"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FVDICFISTTPKMLVNIQARIKDISYMGCLTQVYFLMMFAGMD  
 TFLLAVMAYDRFVAICHPLHYTVIMNPCLCGLLVLASWFIIFWFSLVHVLLMKRLTFS  
 15 TGTEIPHFFCEPAQVLKVACSNTLLNNIVLYVATALLGVFPVAGILFSYSQIVSSLMR  
 TSSTKGKYKAFSTCGSHLCVVSFYGTGLGVYLSSAVTHSSQSSMASVMYAMVTP" (SEQ

ID NO:47).

BASE COUNT 118 a 189 c 144 g 198 t

ORIGIN

20 1 ctttgtggac atctgttca tctccaccac agtccccaaag atgctagtga acatccaggc  
 61 acggatcaa aacatctccat acatggggtg cctcactcag gtgtatTTTT taatgtatTTT  
 121 tgctggaaatg gatacttc tactggcgtg gatggccat gaccggTTTG tggccatctg  
 181 ccacccctcg cactacacgg tcatcatgaa cccctgcctc tggtgcctcc tgggtctggc  
 241 atctgggtc atcatttct ggttctcgct gggtcatgtt ctactgtatgaa agagggttac  
 25 301 ctctccaca ggcactgaga ttccgcattt ctctgtgaa cgggctcagg tcctcaaggat  
 361 ggctcgctt aacacccctcc tcaataacat tgcgtgtat gggccacgg cactgtggg  
 421 tgggtttctt gtagctggaa ttctttctc tcaacttcg atttgttctt ctttaatgag  
 481 aacgtccccc accaaggggca agtacaaacg cttttccacc tggatctc acctctgtgt  
 541 ggttcccttg ttcttatggaa caggacttgg ggttatctg agttctgttg tgacccattc  
 30 601 ttccccagagc agtccatgg cctcagtatgtt gtacgccatg gtcacccccc (SEQ ID NO:46).

#### OR34

LOCUS AF127847 649 bp DNA PRI 28-FEB-2000  
 35 DEFINITION Gorilla gorilla olfactory receptor (GGO2) gene, partial cds.  
 ACCESSION AF127847  
 KEYWORDS  
 SOURCE gorilla.  
 ORGANISM Gorilla gorilla  
 40 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 45 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 50 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
 55 /organism="Gorilla gorilla"  
 /db\_xref="taxon:9593"

gene <1..>649  
   /gene="GGO2"  
 CDS <1..>649  
   /gene="GGO2"  
   /codon\_start=2  
   /product="olfactory receptor"  
   /translation="FVDICVTSTVPKTLNIRTQSKVITYAGCITQMYFFILFVVLD  
     SLLLTVMAYDRFVAICHPLHYTIVMSWLCGLLVLSWIVSILCPLQSIMALQLSFC  
     TELKIPHFFCELNQVVLHACSDTFIKDMMMNFTSVLLGGCLAGIFYSYFKILCCICS  
 10   ISPAQGMNKALSTCASHLSVSLFYCTGVGVYLSSAATHNSLSNAAASVMYTVVTS" (SEQ  
   ID NO:49).  
 BASE COUNT 146 a 166 c 129 g 208 t  
 ORIGIN  
   1 ctttgttagac atctgttta ctcaccac agtccaaag acactgtcaa acatccggac  
 15   61 acagagcaaa gtcacccatc atgcagggtt catcaccccg atgtacttt ttatacttt  
   121 tgttagtgtagtggacacgcttac tcctgaccgt gatggctat gaccggttt tgcccatctg  
   181 tcacccctg cactacacag tcattatgaa ctccggctc tgtggactgc tggttctgg  
   241 gcctggatc gtgagcatc tatgttctcc tttacaagaataatggat tgcagctgc  
   301 ctctgtaca gaattaaaaa tccctcattt ttctgtgaa cttaatcagg tcgtccacct  
 20   361 tgcctgttgc gacactttttaaaagacat gatgatgaat ttacaagtg tgctgtgg  
   421 tggggatgc ctgcgtggaa tattttactc ttatcttaag atactttgtt gcatatgtt  
   481 aatctcacca gtcaggaga tgaataaagc actttccacc tgcacatc accttcagt  
   541 tgttcctta tttttatgtt caggcgtagg ttttttttttggatc ttgttaccc ttgttgc  
   601 ctcactctca aatgctcgat ctcaggat gtcacccatc (SEQ ID NO:48).  
 25

### OR35

LOCUS AF127848 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Gorilla gorilla olfactory receptor (GGO3) gene, partial cds.  
 30 ACCESSION AF127848  
 KEYWORDS  
 SOURCE gorilla.  
 ORGANISM Gorilla gorilla  
   Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 35   Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
   reduction of function in primates  
 40 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 45   Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
   source 1..649  
     /organism="Gorilla gorilla"  
     /db\_xref="taxon:9593"  
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   CDS <1..>649  
     /gene="GGO3"  
     /codon\_start=2  
     /product="olfactory receptor"

/translation="FVDTSFISTTVPKMLVNIQARIKDISYMGCLTQVYFLMMFAGMD  
 TFLLAVMAYDRFVAICHPLHYTVIMNPCLCGLLVASWIFIWFSLVHILLMKKLTFS  
 TGTEIPHFFCEPAQVLKVACSNTLLNNIVYVATALLGVFPVAGILFSYSQIVSSLMR  
 TSSTEGKYKAFSTLWISLCVVSLFYGTGLGVYLSSAVTHSSQSSMASVMYAVVTP" (SEQ ID  
 5 NO:51).  
 BASE COUNT 117 a 194 c 143 g 195 t  
 ORIGIN  
 1 ctttgtggac acctcttca tctccaccac agtccccaaag atgcttagtga acatccaggc  
 61 acggatcaa gacatcttcatc acatggggcgtt cctcaactcg gtgtatTTT taatgtatgtt  
 10 121 tgcttggaaatgataatccc tactggccgtt gatggcttat gaccggatTTtggccatctg  
 181 ccacccctgtt cactacacgg tcatacatgaa cccctgcctc tggtgcctcc tgggtctgg  
 241 atcttggttc atcattttctt ggttctccctt ggttcatattt ctactgtatgaa agaagtgtac  
 301 ctctccaca ggcacttgaga ttccgcattt ctctgtgaa cccggcttcagg tcccaaggt  
 361 ggcctgtctt aacaccccttc tcaataacat tgcgttgcgtt gttggccacgg cactgtgg  
 421 tgggtttccctt gtagctggaa ttcccttcctc ctactctcg attgtctctt ctttaatgag  
 481 aacgttcctcc accggaggcga agtacaaaagc cttttccacg ctgtggatctt ccctctgtgt  
 541 ggttcttgcgtt ttctatggaa caggacttgg ggttctatgtt agtctgtgt tgaccactc  
 601 ttcccaagcggc agtccatgg cctcaatgtt gtagccgtt gtcacccccc (SEQ ID NO:50).

## 20 OR36

LOCUS AF127849 650 bp DNA PRI 28-FEB-2000  
 DEFINITION Gorilla gorilla GGO4 pseudogene, partial sequence.  
 ACCESSION AF127849  
 25 KEYWORDS .  
 SOURCE gorilla.  
 ORGANISM Gorilla gorilla  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
 30 REFERENCE 1 (bases 1 to 650)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 35 REFERENCE 2 (bases 1 to 650)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 40 FEATURES Location/Qualifiers  
 source 1..650  
 /organism="Gorilla gorilla"  
 /db\_xref="taxon:9593"  
 gene <1..>650  
 45 /gene="GGO4"  
 /pseudo  
 BASE COUNT 134 a 164 c 132 g 220 t  
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 1 ctggcttagtgggttca tctcggtcgc gggtcccaag atgatgtgg acatcgacgt  
 61 acatagcaga gtcatcttcatc atgcggggccg cctgacacag atgtctttt tttttttttt  
 121 tgcatgtatgatgacatgc tccggactctt gatggcttat gaccggatTTtggccatctg  
 181 tcacccctgtt cactacccacg tcatacatgaa tcctcacccctc tggtcttcatc tagttttgt  
 241 gcttttttc cttagcctgtt ggattccca gctgcacacgc tggattgtgt tacaattcac  
 301 ttgttcaag aatgtggaaa tatctaattt ttatgtatgatccatctcaac ttctcaaact  
 361 tgactgttctt gaacagtgtc atcaatagca tattcacata ttttagatagt actatgtttt

421 gttcccttc cattcaggg atccctttt ctatctataa aattgtcccc tccattctaa  
481 gaattccatc gtcatggg aagtataaag ccctctccac ctgtggctt caccctgtcag  
541 ttgttgttgc tttttatgga atagcatttgc gcgtgtacctt gacttcagctt gtgtcaccaac  
601 cacccaggaa tggtgtgtg gcatcagtga tctacgcgg tggtcacccccc (SEQ ID NO:52).

5

OR37

**LOCUS** AF127850 650 bp DNA **PRI** 28-FEB-2000  
**DEFINITION** Gorilla gorilla GGO70 pseudogene, partial sequence.  
**ACCESSION** AF127850  
**KEYWORDS**  
**SOURCE** gorilla.  
**ORGANISM** Gorilla gorilla  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
**REFERENCE** 1 (bases 1 to 650)  
**AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
**TITLE** The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates  
**JOURNAL** Unpublished  
**REFERENCE** 2 (bases 1 to 650)  
**AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
**TITLE** Direct Submission  
**JOURNAL** Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille  
Montpellier Cedex 5 34396, France  
**FEATURES** Location/Qualifiers  
source 1..650  
/organism="Gorilla gorilla"  
/db\_xref="taxon:9593"  
gene <1..>650  
/gene="GGO70"  
/pseudo  
**BASE COUNT** 128 a 170 c 134 g 218 t  
**ORIGIN**  
1 ctgcctgac atcggttca ctcaccat ggtccccaaatgattggc acgtccaaatc  
61 tcacagcagg ttcatctctt atgcaggctg cctgacttcg atatctctt ttgcatttt  
121 tggggcatacgaagagagac atgtcttgcgtgtatggc ctatgaccgg tttgtaccca  
181 tctgtcaccc ttatatatcat tcaggccatca tgaacccgtt ttcgttgcc ttccatgatt  
241 tgcgtcttttttttttc tttttcatacgatcttgcgtgc agaactgtat  
301 tgccttacaa atgacatgtcgatcgaggatgttggaaatctt aatttcctctt gtgacccttc  
361 tcaactgccc catctcacat gtttgtacat cttccacaaatcacataatca tgtattcccc  
421 tgctgccata ttgggttttc ttccatcttc gggggccctt ctctttaacc atgtatgtt  
481 ttcccttcatttcttgcgttcatcatatgttgggggttgc aagccctcccacctgtgg  
541 ttgtttgttcatatgttgcgttacggctcg gagggttacctcagttcagatgttgtatctt  
601 caacaagaaa ggctcgatgcctcgttgcgttacacgggttgcacggcc (SEQ ID NO:53).

OR38

50 LOCUS AF127851 649 bp DNA PRI 28-FEB-2000  
DEFINITION Gorilla gorilla olfactory receptor (GGO71) gene, partial cds.  
ACCESSION AF127851  
KEYWORDS .  
SOURCE gorilla.  
ORGANISM Gorilla gorilla  
55 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 5 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 10 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
     Montpellier Cedex 5 34396, France  
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 15 /db\_xref="taxon:9593"  
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     /gene="GGO71"  
 CDS <1..>649  
     /gene="GGO71"  
 20 /codon\_start=2  
     /product="olfactory receptor"  
     /translation="FADLCFTSTTVPKMLLNILTQNKFITYAGCLGQIFFFTSGCLD  
     NLLLTVMAYDRFVAICHPLHYTVIMNPRLCGLLVLGSWCISVMGSLLETTLTVRLSFC  
     TKMEIPHFFCDLLEVLKLACSDTFINNVVIYFATGVLGVIPFTGIFFSYYKIVFSILR  
 25 ISSAGRKHCAFSTCGSHLSVVTLYGTGFVYLSSAATPSSRTSLAASVMYTMVTP" (SEQ ID  
     NO:55).  
 BASE COUNT 130 a 171 c 136 g 212 t  
 ORIGIN  
     1 ttttgtgac ctctgttta cctccacgac tgcccaaag atgttactga atatactgac  
 30 61 acagaacaaa ttccataacat atgcaggctg ttcggcgtcgt atttttttt tcacccatt  
     121 tggatgcctg gacaattac tcttgactgt gatggcttat gaccgttgc tggccatctg  
     181 tcacccccctg cactatacg gtcatacgaa ccccccggcgc tggactgc tggttctggg  
     241 gtcctggcgtc atcgtgtca tgggtccct gtcgagacc ttgactgtt tgaggctg  
     301 ctctgcacc aaaatggaa ttccacactt tttttgtat ctcttgaaag tcctgaagct  
     361 cgcctgttct gacaccttca ttaataacgt ggtgatatac ttgcacaatg ggcgcctggg  
     421 ttttttttttccatctggaa ttttttttttcttactataaa attttttttcttactatgag  
     481 gatttccatca gtcggggaaag agccaaagc gtttccacc tgggttccc acctctcgt  
     541 ggtcacccctt ttctatggca cgggcttgg ggtctatctc agttctgcag ccacaccatc  
     601 ttcttaggaca agtctggcgg cctcagtgtat gtacaccatg gtcacccccc (SEQ ID NO:54)  
 40  
**OR39**  
 LOCUS AF127852 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Eulemur fulvus olfactory receptor (EFU35) gene, partial cds.  
 45 ACCESSION AF127852  
 KEYWORDS .  
 SOURCE Eulemur fulvus.  
 ORGANISM Eulemur fulvus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 50      Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
     reduction of function in primates  
 55 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 5 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
     /organism="Eulemur fulvus"  
     /db\_xref="taxon:13515"  
 10 gene <1..>649  
     /gene="EFU35"  
 CDS <1..>649  
     /gene="EFU35"  
     /codon\_start=2  
 15 /product="olfactory receptor"  
     /translation="LTDICLSTATVPKMLANIRTRSQSITYAACLTQMCFVLGSATLE  
     NFLLAVMAYDRYVAICHPLRYAVIMNRLCGFLILLSLSISIMDTLLHDLMVLRLSFC  
     THLEIPLFFCEVVQVIKACSDTLINNLLIYFAAGVLGGVPLSGIIFSYTQIASSVLR  
     MASASGKYKAFSTCGSHLSVVSLLYGTGLGVYISSAFMHSPRTMAVASMMYTVVTP" (SEQ

20 ID NO:57).  
 BASE COUNT 123 a 176 c 148 g 202 t  
 ORIGIN  
     1 cctcaactgac atctgttaa gcacagccac cgtcccaaag atgctggcaa acatccgaac  
     61 acggaggtagc agcatcacgt atgcagcctg cctcacccag atgtgccttg ttctgggttc  
 25 121 tgctacgtg gaaaatttc tcctggcagt aatggcttat gaccgctatg tggccatctg  
     181 tcacccctcg agatacgcgg tcacatgaa cttcgcttc tggtggcttc tgatctttt  
     241 gtccctgtct attagcatca tggacaccct gctccacgt ctgatggctc tgccgtgc  
     301 ctctgeaca cacctggaga taccctctt ctctcggag gttgtgcaag tcataagct  
     361 tgcctgttct gataccctca tcaataacct ctgtatatat ttgcagctg gcgtgtggg  
 30 421 aggtgttctc ctgtctggga tcattttctc ttatactcag attgcccttc ctgtttttag  
     481 aatggcatca gcaagtggaa agtataaage tttttccacc tttgtggcttc acctctcggt  
     541 tgtgtccttgc ctctacggga caggtttggg ggtgtacatc agttctcgctt ttatgeactc  
     601 tcccaggacg atggcagttt ctcaatgtat gtacacgggt gtcactccc (SEQ ID NO:56).

### 35 OR40

LOCUS AF127853 645 bp DNA PRI 28-FEB-2000  
 DEFINITION Eulemur fulvus EFU36 pseudogene, partial sequence.  
 ACCESSION AF127853  
 40 KEYWORDS  
 SOURCE Eulemur fulvus.  
 ORGANISM Eulemur fulvus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.  
 45 REFERENCE 1 (bases 1 to 645)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
     reduction of function in primates  
 JOURNAL Unpublished  
 50 REFERENCE 2 (bases 1 to 645)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
     Montpellier Cedex 5 34396, France  
 55 FEATURES Location/Qualifiers

source 1..645  
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   /db\_xref="taxon:13515"  
 gene <1..>645  
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   /pseudo  
 5 BASE COUNT 118 a 189 c 138 g 200 t  
 ORIGIN  
   1 ctttgctgac gtctgttca cctccaccac ggtgcccaag atgttagtga acatccaggc  
 10 61 gcacagcaag gccatcacat acaaaggctg ctcacccag atgtgtttt tcttgatttt  
   121 tggggccta gtttgcact gacgggatg gctatgacc ggttcgtgc catctgcac  
   181 cccctgcgtc acatggcat catgaacccc aggctctgtg gtcitctgtc ttcctttct  
   241 tggttgtatc gcttgaccta ttctctgtc caaaatgtca tggttttag ggttccttc  
   301 tgccaagaaa tagaaatccc ccactacttc tftgaacttg ctcagatct cacgctegcc  
 15 361 tgctctgaca ccctagttaa tgacgtccctg ctgtatttc tatctgctct gctgggttt  
   421 attcccccta ctgggatctt ttatttttat tccttccat aatgtgcatt  
   481 tcctctgtcg gagggaagta caaaggctt tccacctgtg ggttcacctt ctccgtcg  
   541 tccttgtct acggtacagg ccttgggtc tacctaactt ctgaaacagc ccagccctcc  
   601 agaagggtt caatagccctc ggtgtatc accatggta ccccc (SEQ ID NO:58).  
 20

## OR41

LOCUS AF127854 647 bp DNA PRI 28-FEB-2000  
 DEFINITION Eulemur fulvus EFU37 pseudogene, partial sequence.  
 25 ACCESSION AF127854  
 KEYWORDS  
 SOURCE Eulemur fulvus.  
 ORGANISM Eulemur fulvus  
   Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 30   Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 647)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
   reduction of function in primates  
 35 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 647)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 40  Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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   /db\_xref="taxon:13515"  
 45 gene <1..>647  
   /gene="EFU37"  
   /pseudo  
 BASE COUNT 118 a 192 c 141 g 196 t  
 ORIGIN  
   1 ctttgtgac atctgttca cctccaccac catcccaag atgactgtgg acatctaac  
 50 61 tcacagcaga gtcatctctt ctggggctgt tctgacccag atgtctctgt ctctgtttt  
   121 tggggatgtc gatgatatgc ttctgaccgt gtccggctgt gacctgtttt tgccatctg  
   181 ccacccctcg cactacacgg tcatcatgaa ccccaacttc tggccctcc tggttctgtat  
   241 atcttgttcc atcatgtccc tgggtgtctt ggttcacctc ctactgataa ggaggctgac  
 55 301 attccccagg gecacagaaa tcccacatca ttctgtgaa ctggctaaaa ttctcaaagt

361 ggcccactct gacagettca tcaataacat ctccctgtac ttgtcggctg tttgcgtgg  
421 tgtgttccc atcacaggga tcctctactc ctactctaaa attgtctccct ccgtaatgag  
481 gatgtcgatcc actgcaggca agaagaagc atttccacc ttgtggcttc atttgtgtgg  
541 tctgttgc tcatggaca gggcttgggg tctacccatc ctctgttg acccccttctt  
5 601 cccagagcag cagcattgcc tcagtgtat actcggtgtt caccccc (SEQ ID NO:59).

## OR42

LOCUS AF127855 652 bp DNA PRI 28-FEB-2000  
10 DEFINITION Eulemur rubriventer ERU38 pseudogene, partial sequence.  
ACCESSION AF127855  
KEYWORDS  
SOURCE Eulemur rubriventer.  
ORGANISM Eulemur rubriventer  
15 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.  
REFERENCE 1 (bases 1 to 652)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
20 reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 652)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
25 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
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/organism="Eulemur rubriventer"  
30 /db\_xref="taxon:34829"  
gene <1..>652  
/gene="ERU38"  
/pseudo  
BASE COUNT 124 a 191 c 136 g 201 t  
35 ORIGIN  
1 ctttgttac atctgttca cttccaccac catcccaag atgtggta acattgacac  
61 acacagcaa gacatctctt acgtggatg cttcaacttag atgtattttt tcatgggttt  
121 tggggactt gacaacttcc tccgtaccgtt gatggctgtt gaccggttt tgcccatctg  
181 tcacccctgtt cactatcgac tacagtcatc atgaaccccc gcttctgtgc cttctgttt  
40 241 ctgtatgtt ggttcatcat gtccctggat gcccgggtt atgttctact tatactgagg  
301 ctgacctttt ctttagaaac tgaatccca catttcctt gtagccggc tcagatgttc  
361 gaggtggccc gctctgacac ctttatcaat aacatctgtt tgacttggt ggctgtgtt  
421 ctgtatgtt cttgtcacgg ggatccctcta ccctactctt aaaaatgtctt cttcttaat  
481 gaggatgtcc tccactgeag gcaagaagaa agcatttcc acctgtgggtt ctcaccccttc  
45 541 tttgtgttcc tttgttctatg gaacaggact tggggcttac ctaagtctgtt ctgtgacccc  
601 ttcttcccttccatc agcagcgcacca ttgcctcagt gatgtacaca gtgtcaccc cc (SEQ ID NO:60).

## OR43

50 LOCUS AF127856 648 bp DNA PRI 28-FEB-2000  
DEFINITION Eulemur rubriventer ERU39 pseudogene, partial sequence.  
ACCESSION AF127856  
KEYWORDS  
SOURCE Eulemur rubriventer.  
ORGANISM Eulemur rubriventer

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 648)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 5 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 648)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 10 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..648  
 15 /organism="Eulemur rubriventer"  
 /db\_xref="taxon:34829"  
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 20 BASE COUNT 132 a 173 c 141 g 202 t  
 ORIGIN  
 1 cttingcagac atctgtttt tgccaccac tgcccagag atgctgaatg tgccagacatg  
 61 gagcaaagt atatccata caggctgcata caccaggatg gacttttct tgctctttgt  
 121 aggactggac aactccctca tgaccgtgtat ggccctgtac ccgtttgtgg ccatctgtca  
 25 181 cccccctgcac tatgcgtatc agtcatcatg aaccccgaggc tctgtgcatt tcttgtctg  
 241 gtgttctggta tccgtgtatc ctcgtatcc ttgttacaaa gcttaatggt gtgcagata  
 301 accttctgtat cagacttgaa aatccccac ttttctgtg aacttaatca gataatccac  
 361 ctgcctgtt tggacacett tcttaatgac atggtgatgt attggcagt gatgtgtcg  
 421 ggtgggggggt gccttactgg gatcccttac tcttactcta agatagttc ctccgtacgt  
 481 gcaatctcc cggttcaggaa gaagtataaa gcattttcca cctgtgcac tcacctctcg  
 541 gtgcgtctcc tattttatgt tacatgcata ggggtgtacc tcagtgtc tacacacaac  
 601 tcacactcca gcgcaacagc ctccgtatg tacacgggtt caactcccc (SEQ ID NO:61).

#### OR44

35 LOCUS AF127857 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Eulemur rubriventer olfactory receptor (ERU40) gene, partial cds.  
 ACCESSION AF127857  
 KEYWORDS  
 40 SOURCE Eulemur rubriventer.  
 ORGANISM Eulemur rubriventer  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 649)  
 45 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 50 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 55 source 1..649

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        gene      <1..>649
                /gene="ERU40"
5       CDS      <1..>649
                /gene="ERU40"
                /codon_start=2
                /product="olfactory receptor"
                /translation="LSDICFTSTIPKMLVNLHAHSKDISYRECLTQVYFFMIFAGLD
10      NFLLTVMAYDRFAICHPLHYMVIMNPRFCALLVLMWSFIMSVALVHVLILRLTFS
                LETEIPHFSCEVAQILKVARSDTFFNNICLYLSAVLLGVFPVMGILFSYSKIVSSLMR
                MSSTSNAKNAFSTCGSHLCVSVSLFYGTALGVYLSSAVTPSSQSSAIASVMYTVVTP" (SEQ ID
NO:63).
BASE COUNT    119 a   187 c   131 g   212 t
15      ORIGIN
                1 cctttctgac atctgttca cctctaccac catccaaag atgctggta accttcacgc
                61 acacagcaa gacatctcct acaggagggt cctactcgat gtgtatTTT ttatgatttt
                121 tgctggactg gataattcc tcctgaccgt gatggcctat gaccggtttg tggccatctg
                181 ccaccccccactacatgg tcatcatgaa tccccgttc tggccctcc tggctctcat
20      241 gtcttggttc atcatgtctc tgggtgcctt gggtcatgtt ctacttatat tgaggctgac
                301 tttttcccta gaaactgaaa tcccacattt ctccctgttag gtggctcaga ttctcaaggt
                361 ggcccgtct gacacccctt tcaataaacat ctgcttatac ttgtcggtgt tggctgggg
                421 tgggtttccc gtcatgggaa tcctcttctc ctactctaa attgttcat ccttaatgg
                481 gatgtccctcc acttcagcaa agataaaagc attttccacc ttgtgggtctc acctctgtgt
                541 ggtctttttg ttctatggaa ctgcacttgg ggtctacacctc agctctgtgt tgaccccttc
                601 ttccagagc agcgccattt cctcagtat gtacacgggt gtcacccccc (SEQ ID NO:62).

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## OR45

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30      LOCUS    AF127858    648 bp    DNA      PRI    28-FEB-2000
DEFINITION Eulemur fulvus EFU56 pseudogene, partial sequence.
ACCESSION AF127858
KEYWORDS
SOURCE Eulemur fulvus.
35      ORGANISM Eulemur fulvus
                Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;
                Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.
REFERENCE 1 (bases 1 to 648)
AUTHORS Giorgi,D.G. and Rouquier,S.P.
40      TITLE The olfactory gene repertoire in primates and mouse: evidence for
                reduction of function in primates
JOURNAL Unpublished
REFERENCE 2 (bases 1 to 648)
AUTHORS Giorgi,D.G. and Rouquier,S.P.
45      TITLE Direct Submission
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,
                Montpellier Cedex 5 34396, France
FEATURES Location/Qualifiers
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50      /organism="Eulemur fulvus"
                /db_xref="taxon:13515"
        gene      <1..>648
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                /pseudo
55      BASE COUNT    131 a   180 c   142 g   195 t

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121 tgcagatgg tagtgcacttgc cctgcacttg atggcctatg actggttgg gcccacatgt  
5 181 caccctgc actatgtgc catcatgaac cccaggctc tgccactgt tgcactgt  
241 tcctggatca tgagtgcctt gaattccctt tgccaaatgt taatgggtt gccactgccc  
301 ttctgtgcac agttggaaat ccccccaggat ttctgtgaac ttaatcgat aatccctt  
361 gcctgtctgc acacccttc taatgacgtg gtggatgtt tggcagatgt gctactgggt  
421 gaggggtgcc ttactggat cccttactct tactctaaga tagttccctc cgtaatgtca  
10 481 atctcctcgg ctccggaaat gtataaaga tttccacct gtgcacatca cctctcggtc  
541 gtctccttat ttactgcac aagccctggg gtgtacccgt getctgctgc tacacacaac  
601 tcacactcca ggcacacagc ctccggatgt tacacgggtt gtcactccc (SEQ ID NO:64).

**OR46**

15 LOCUS AF127859 643 bp DNA PRI 28-FEB-2000  
DEFINITION Eulemur fulvus olfactory receptor (EFU57) gene, partial cds.  
ACCESSION AF127859  
KEYWORDS .  
20 SOURCE Eulemur fulvus.  
ORGANISM Eulemur fulvus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
REFERENCE 1 (bases 1 to 643)  
25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 643)  
30 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
35 source 1..643  
/organism="Eulemur fulvus"  
/db\_xref="taxon:13515"  
gene <1..>643  
/gene="EFU57"  
40 CDS <1..>643  
/gene="EFU57"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="FADICFVSTTVPEMLNVQTWSKVISYTGCITQMDFFLLFVGLDN  
FLLTVMAYDRFVAICHPLRYAVIMNPRLCVFLVLVSWILSVLNSLSQLMVRLTFCT  
45 DLEIPHFFCELNQIIHLACSDTFLNDVVVMYLAQMILLGGCLTGILYSYSKIVSSVRAI  
SSAQGKCKAFSTCASHLLVVSLFYCTCLGVYLSSATHNSHSSATASVMYTVVTP" (SEQ ID  
NO:66).  
50 BASE COUNT 127 a 171 c 143 g 202 t  
ORIGIN  
1 cttgcagac atctgttttgc tgcacccagatg atgtcaatgc tgcagacatg  
61 gagccaaatgt atatccatca caggctgcat cacccagatg gactttttct tgcttttgt  
121 aggactggac aacttcctcc tgaccgtatgc ggcctatgc cggttttgg ccatctgtca  
55 181 ccccccgc tatgcgtatgc tcatgaacc caggctgtgt gtatcttc ttcgtgtc  
241 ctggatccatgc agtgtcctatgc attccatgtc acaaagctt atgggttgc ggctaacat

301 ctgtacagac ttggaaatcc cccactttt ctgtgaactt aatcagataa tccaccctgc  
 361 ctgtccggac acctttcta atgacgttgt gatgtattt gcagtgtatgc tgctgggtgg  
 421 gggatgcctt actgggatcc ttactctta ctctaagata gtttcctccg tacgtgeaat  
 481 ctccctcggt caggggaagt gtaaggcatt ttccacactgt gcatctcacc tcitggcgat  
 5 541 ctccatttatttattgtacat gccttaggggt gtacttgagt tctgtacac acaactcaca  
 601 ctccagcgcga acagcctcg tgatgtacac ggtggtaact ccc (SEQ ID NO:65).

## OR47

10 LOCUS AF127860 644 bp DNA PRI 28-FEB-2000  
 DEFINITION Eulemur rubriventer ERU66 pseudogene, partial sequence.  
 ACCESSION AF127860  
 KEYWORDS .  
 SOURCE Eulemur rubriventer.  
 15 ORGANISM Eulemur rubriventer  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 644)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 20 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
     reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 644)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 25 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
     Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..644  
 30        /organism="Eulemur rubriventer"  
       /db\_xref="taxon:34829"  
     gene <1..>644  
       /gene="ERU66"  
       /pseudo  
 35 BASE COUNT 113 a 191 c 145 g 195 t  
 ORIGIN  
     1 cttttctgac atctgttca ctccggccac catccaaag atgctgtgga gcatccgggc  
     61 acagagcaaa tccatcacgg tgccggctg ctcacacag atgtactgtt tcatggctt  
     121 tggactctgt gacaatctgt tgctgttgtt catggctt gaccacttg tggccatctg  
 40 181 taccctctgt cactacacag tcatcatgaa cccagtgctc tggccagg tgctgtcca  
     241 caccgggtt gtcagcatcc tggggccctt cctcggagag tgaccgtgtt gggccctt  
     301 ttggtgactt cactgaaatc ccacatttctgtgagctt ccctgaggctt ctccagctct  
     361 cccactctgtt cccctccatc aataatgtca tattatacat tggacgggtt tcatgggtt  
     421 ctccctctt gctgagatcc ttctcttta ttctccaact gtttttctgt tcctgaggat  
 45 481 ctcaacagca ggggggaagt ataaagttt ttccctctgtt gagtttccacc ttccgggtt  
     541 tgcctgttcc ttggggacctt gcctggggtc tagctcgtt ccacatggac acacgctt  
     601 ccgacagggg tggcatacata ctgtgtcaccccc (SEQ ID NO:67).

## OR48

50 LOCUS AF127861 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Eulemur rubriventer olfactory receptor (ERU67) gene, partial cds.  
 ACCESSION AF127861  
 KEYWORDS .  
 55 SOURCE Eulemur rubriventer.

ORGANISM Eulemur rubriventer  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
     /organism="Eulemur rubriventer"  
     /db\_xref="taxon:34829"  
 gene <1..>649  
     /gene="ERU67"  
 CDS <1..>649  
     /gene="ERU67"  
     /codon\_start=2  
     /product="olfactory receptor"  
     /translation="FMDICFTTVIPKMLVNFLSETKAISYVGCLVQMYFFMALANTD  
         SYLLASMAIDRLVAICKPFHYDVMSPRCLLMLGSCTISHLHSLFRVLLMSRLSFC  
         ASHIIKKHFFCDTQPVLKLSCSDTSSSQIVVMTELAVIVTPFLCIIFSYLRIITVLA  
         IPSAAGKWKAFSTCGSHLTVVVLFYGSVIYVYFRPLSMYSVMKDRVATVMYTVVTP" (SEQ ID NO:69).  
 BASE COUNT 119 a 200 c 141 g 189 t  
 ORIGIN  
 1 ttcatggat atctgcttca caaacgtcat tgtgcctaag atgctggta attccctgtc  
 61 agagacaaag gccatctct atgtgggtg tctggccag atgtacttct tcatggccct  
 121 tgcaaacact gacagtcacc tactggcctc catggctatt gaccggctgg tggccatctg  
 181 caaaccccttc cactatgtat tggttatgag cccacggcggt tgccctctca tgggtttgg  
 241 ttcttgaccat atctccccacc tacactccct gtccgggtg ctactcatgt ctgcgcctgc  
 301 ttctgtgec tcccacatca ttaagcacit ttctgtgtat acccaggctcg tgctaaagct  
 361 ttctgtctc gacacatccct ccagecagat tgggtcatgt accgagaccc tggctgtcat  
 421 cgtgacccccc ttccctgtca tcatacttcctt ctatctgaga atcatacatca ctgtgtcg  
 481 aatccccctct gcagccggga agtggaaaggc ctctccacc tgggtctcc acctcaactgt  
 541 ggtggccctg ttctatggca tggtcatcta tgggtattc aggccccctgt ccatgtactc  
 601 agtcatgtat gaccgggttag ccacagttat gtacacggta gtgacaccc (SEQ ID NO:68).

OR49

45 LOCUS AF127862 649 bp DNA PRI 28-FEB-2000  
DEFINITION Eulemur fulvus olfactory receptor (EFU83) gene, partial cds.  
ACCESSION AF127862  
KEYWORDS .  
SOURCE Eulemur fulvus.  
50 ORGANISM Eulemur fulvus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
55 TITLE The olfactory gene repertoire in primates and mouse: evidence for

reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source	1..649
	/organism="Eulemur fulvus"
	/db_xref="taxon:13515"
gene	<1..>649
	/gene="EFU83"
CDS	<1..>649
	/gene="EFU83"
	/codon_start=2
	/product="olfactory receptor"
	/translation="FSDICLVSTTVQMLNVQTHSKVISYAGCVTQMDFVLFVGLD SFLLTVMAYDRFVVICHPLHYAVTMNPRLCGLLVLWVCFC LDLEIPHFFCELNEIIHLACSDTFLIDMVMYFSALLGGGSLAGILYSYSKIVSSVRA ISSAQGKYKAFSTCASHLAVVSLFYCTSLGVYLSSAATHNSHSSATASVMYTVVTP" (SEQ ID NO:71).
BASE COUNT	119 a 182 c 152 g 196 t
ORIGIN	
25	1 ctttcgtac atctgcttgg tctcgaccac tgcccccacat atgctggta atgtgcagac 61 acacagcaaa gtcataatcc acgcaggctg cgtcaccacat atggacttct ttgtactctt 121 tgttagggctg gacagcttcc tcattaccgt gatggcctat gaccgggttg tggcatctg 181 ccacccactg cactacgccc tcacatgaa ccccaggctc tggggctgc tggctgtctg 241 gtcttggatc atgagtgcctc tgagttccctt gtagaaage ttatgtggtc tggggatgtg 300 ctctgtctcg gacttggaaa tccccactt ttctgtgaa cttatgaga taatccacct 361 gcccgttct gacacccttc ttatgttcat ggtgtatgtat ttctcagctc tactgtgtgg 421 tgggtgttcc ctggctggaa tccttacttcttacttcaag atagttcttcc ctgtacgtgc 481 aatccctca gctcaggggaa agtataaagc atttccacc tggcatctc acctcgggt 541 tggctcccta ttatgtcga caagcctcg ggtgtacttg agtctgtctg ctacacacaa 601 ctcacactcc agcgaacag ctcggatgt tacacgggt gtcactccc (SEQ ID NO:70).

## OR50

LOCUS AF127863 642 bp DNA PRI 28-FEB-2000

40 DEFINITION Eulemur rubriventer EFU84 pseudogene, partial sequence.

ACCESSION AF127863

KEYWORDS

SOURCE Eulemur rubriventer.

ORGANISM Eulemur rubriventer

45 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 642)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
50 reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 642)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,

Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..642  
   /organism="Eulemur rubriventer"  
 5     /db\_xref="taxon:34829"  
 gene <1..>642  
   /gene="EFU84"  
   /pseudo

BASE COUNT 130 a 180 c 138 g 194 t

10 ORIGIN

1 ctttgttagac atctgtttt tctctaccat ggcccaaag atgctggta acatcaagac  
 61 acacagcagt catatccat gcaggctgt tcacccatgc acactttcc ataatcttg  
 121 cagaggtaa catcttcctc ctgacggta tggcstatga ccgggtgtg gccatctgc  
 181 accccctgca ctacacggcc atcatgaacc ccaggctctg tgaactgctg gttctggc  
 .15 241 cctggatcat aagtggcccg aatccctgt tacaaagtgt aaagggtgtg tggctgc  
 301 tctgtacaaa ctggaaatc cgtcaactt tctgtgtacta tagatactac atcttgc  
 361 ttgtgacacc tctgttcatg acgtggatcatattgca gctgtgggc tggctgtt  
 421 tcctcttgct gggatccctt actcttaactc tcaagatgtt tcctccacac gtgactctc  
 481 ctcagctcag gcaaggtaa aacgatttc cacctgtca getcacctcg ccgttgtc  
 20 541 tctatttac tgcacaagcc tcggggtaa ctggagctct gctgtcacac acaacccaca  
 601 ctccagcga acagcctcgg tgatgtacat ggtggtaact cc (SEQ ID NO:72).

## OR51

25 LOCUS AF127864 652 bp DNA PRI 28-FEB-2000  
 DEFINITION Eulemur fulvus EFU86 pseudogene, partial sequence.  
 ACCESSION AF127864  
 KEYWORDS  
 SOURCE Eulemur fulvus.  
 30 ORGANISM Eulemur fulvus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 652)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 35 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 652)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 40 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..652  
 45     /organism="Eulemur fulvus"  
       /db\_xref="taxon:13515"  
 gene <1..>652  
   /gene="EFU86"  
   /pseudo

50 BASE COUNT 126 a 166 c 152 g 208 t  
 ORIGIN

1 cttgcagac atctgtttt gttccaccac tgcccaaag atgctggta atgtgcagac  
 61 acagagcaaa gtcataatcc acgcaggctg cgtcacccag atggacttt tcataactt  
 121 tgcagggtt gatatctta tgctgtatcat gatggcttat gaccggttt gggecatctg  
 55 181 tcacccactg cagtagacgg tcatcatgaa cccaggctc tggtggctc tggtgttgt

241 gcccggatc ttgagtgacc tgaattccctt gttacaaagc ttaatggtgt tgcactgtc  
 301 ctttttaga cacttggaaa tcctcacttt tcctgtgaac ttaatcagggt tgccaccc  
 361 gcctgtctg aaacccttctt taatgacatg gtatgtatc tgatatctgt gggtctggg  
 421 ggtggtcccc tggctgggac tccttattct tccttactgc agaatagttt gctccatacg  
 5 481 tgcaacgtcc tcagtcagg ggaagtataa agcattccc acctgtcat ctcaccc  
 541 agttgtctcc ttatctccct gcacaatcttcc aggggtgtac ctcaagcttg ctgtaccc  
 601 gaattcgtgc tccagtcagc tagecttggt gggtacacg gggtactc cc (SEQ ID NO:73).

## OR52

10 LOCUS AF127865 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Eulemur fulvus olfactory receptor (EFU87) gene, partial cds.  
 ACCESSION AF127865  
 KEYWORDS .  
 15 SOURCE Eulemur fulvus.  
 ORGANISM Eulemur fulvus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 649)  
 20 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 30 source 1..649  
 /organism="Eulemur fulvus"  
 /db\_xref="taxon:13515"  
 gene <1..>649  
 /gene="EFU87"  
 35 CDS <1..>649  
 /gene="EFU87"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="FVDICFTSTTIPKMLVNIEHSKDISYMGCLTQMYFFMIFAGLD  
 40 NFLLTVMAYDRFVAICHPLHYTVIMSPRCALLVLISWFIMTLVALVHVL  
 LRLTFS LETEIPHFFCDLAQILEVAHSDTLINNICKMLSTVLLGVFPVTGILFSYSKIVSSL  
 MSSTAGKKAFSTCGSHLSVVCLFCGTGVGVYLSSAVTPSSQSSIASVMFTVVTP" (SEQ ID  
 NO:75).  
 BASE COUNT 125 a 187 c 134 g 203 t  
 45 ORIGIN  
 1 ctttgtgac atctgttca cctccaccac catccccaaatgctggta acattgaaac  
 61 acacagcaaa gacatctccat acatggatg cctcaactcg atgtatttttt tcatgatttt  
 121 tgctggactg gataattcc tcctgactgt gatggcttat gaccggtttggccatctg  
 181 ccacccctta cactacacgg tcatcatgag tccccgccttc tgccctcc tggctctcat  
 241 atctgggtc atcatgaccc tgggtgcctt ggtcatgta ctactgatat tgaggctgac  
 301 ctctcttta gaaactgaaa tccccatctt ctctgtgac ctggctcaga ttctcgagg  
 361 ggcccaactt gataccctca tcaataaacat ctgcattgtac ttgtcgactg tggtgctgg  
 421 cgtgtttctt gtcacggggta tcctcttc tctactctaa attgtctctt ccttaatgag  
 481 gatgtcctcc actgcaggca agaagaagc atttccacc tgggtctc acctctctgt  
 541 ggtctgttcttgcggaa caggagttgg tggctatctc agtctgttg tgaccccttc

601 ttcccagagc agcagcattg cctcagtat gttcacggtg gtcacccccc (SEQ ID NO:74).

### OR53

5 LOCUS AF127866 646 bp DNA PRI 28-FEB-2000  
DEFINITION Macaca sylvanus MSY1 pseudogene, partial sequence.  
ACCESSION AF127866  
KEYWORDS .  
SOURCE Barbary ape.  
10 ORGANISM Macaca sylvanus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Macaca.  
REFERENCE 1 (bases 1 to 646)  
15 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 646)  
20 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
25 source 1..646  
/organism="Macaca sylvanus"  
/db\_xref="taxon:9546"  
gene <1..>646  
/gene="MSY1"  
/pseudo  
30 BASE COUNT 115 a 186 c 144 g 201 t  
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1 cttingtgc atctgttta tctccaccac cgtccccagg atgctgatga acatccaggc  
61 atggagcaaa gacatctctt acgtgggggt cctcactcg gtgtatffff taatgtatgtt  
35 121 tgctggaatg gatactttcc tactggccat gatggcttat gacccggtttg tggccatctg  
181 ccacccctcg cactacacgg tcatcatgaa cccctgcctc tgccgcctcc tggttctggc  
241 atcttgcattc atcattttat gggctccctt agtcatattt ctatgtatga agagtttgtat  
301 ctccataggc actgagattc cgcatattttt ctgtgaacttg gtcagggtcc tcaagggtggc  
361 ccgcctgtat actctccctcg ttaacattgtt ctgtatgtt gccacagcac tgctgggtgt  
40 421 gttccctgtat gctgggtatc ttcttccta ctctcagatc gtctccctt taatgaggat  
481 gtcccccacc gagggcaagt gcaagaccc ttccacccgtt gggctccacc tctgtgtgg  
541 ctccctgtatc tatggaaacag gacttgggggt ctatctcagt tctgtatgtatccatcttc  
601 ccagagcagc tccatggccct cagtgatgtatccatggtc acccccc (SEQ ID NO:76).

### OR54

45 LOCUS AF127867 649 bp DNA PRI 28-FEB-2000  
DEFINITION Macaca sylvanus olfactory receptor (MSY12) gene, partial cds.  
ACCESSION AF127867  
50 KEYWORDS .  
SOURCE Barbary ape.  
ORGANISM Macaca sylvanus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
55 Macaca.

**REFERENCE 1** (bases 1 to 649)  
**AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
**TITLE** The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates  
**JOURNAL** Unpublished  
**REFERENCE 2** (bases 1 to 649)  
**AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
**TITLE** Direct Submission  
**JOURNAL** Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille, Montpellier Cedex 5 34396, France  
**FEATURES** Location/Qualifiers  
 source 1..649  
     /organism="Macaca sylvanus"  
     /db\_xref="taxon:9546"  
 gene <1..>649  
     /gene="MSY12"  
 CDS <1..>649  
     /gene="MSY12"  
     /codon\_start=2  
     /product="olfactory receptor"  
     /translation="FVDVCFVTTVPKMLVNIQTQNKVITYAGCISQMCFFIFFAGLD  
         IFMLTVMAYDRFAICHPLHYTVMNPRLCGLLVLASWIMSALNSLQLSMLVHLSFC  
         ADLEIPHFCELNQVIHLTCSDTFLNDMVYLSAVLLGGGCLIGILYSYSKIVSSIHA  
         ISSVQGKYKAFSTCASHLSVVSLFYCTILGVYLSSAATHSSHASAAVSVMYTVVT" (SEQ ID

NO:78).  
BASE COUNT 132 a 173 c 138 g 206 t  
ORIGIN  
1 ctccgtagac gtctgttttg tgtccaccac tgtcccgaaatgtctggta acatccagac  
61 acagaacaaa gtcataacct atgcaggctg catcagccag atgtgcgtt tcataatttt  
121 tgcaaggattg gacatctta tgctgaccgt gatggcctac gacaggtttg tggccatctg  
181 tcacccctg cactacacgg tcacatgaa ccccaaggctc tggtggactgc tgggtctggc  
241 gtcctggata atgagtgccca tgaatttcitc atitgcaaagg ttaatggta tgcacccttc  
301 ctctctgtca gacttggaaa ttccccactt ttcttgtaa ctaatcagg tcatccaccc  
361 taccctgtct gacactttc ttaatgacat ggtgtatgttttgcaggctg tgctgtgg  
421 tgggggatgt ctcatggga tccttactc taatctaag atcgctctt ctatacatgc  
481 aatctcatca gttcaggggaa agtacaaggc attttccacc tgtagtgcattc acctctcggt  
541 tggctccatca ttttatgttcaatccatgg tggtagtgcatttgcggcaacccacag  
601 ctcacacgcgca agtgctgcag tctcggtgat gtacactgtg gttacccccc (SEQ ID NO:77).

40 OR55

45 LOCUS AF127868 649 bp DNA PRI 28-FEB-2000  
DEFINITION *Macaca sylvanus* olfactory receptor (MSY16) gene, partial cds.  
ACCESSION AF127868  
KEYWORDS .  
SOURCE Barbary ape.  
ORGANISM *Macaca sylvanus*  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Macaca.  
50 REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
55 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 5 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
     /organism="Macaca sylvanus"  
     /db\_xref="taxon:9546"  
 10 gene <1..>649  
     /gene="MSY16"  
 CDS <1..>649  
     /gene="MSY16"  
     /codon\_start=2  
 15     /product="olfactory receptor"  
     /translation="LADIGFTSTVPKMLVNIQAQSNAlSYAGCISQMYFFMVFGGID  
     TFLLTVMAYDRYVAICHPLYYPPVIMNPRLCGLLVWSWFLSLSIQSLLMLQLSFC  
     TSWVIQHFYCELAQALTACSDTHINYILLYVTGLLGFVPFSGILFSYTQIVSSILR  
     ISSTDGKHAKFSNCGSHLSVVFYGTGLGVYLSSNASSSWRGMVASVMYTVVTP" (SEQ  
 20 ID NO:80).  
 BASE COUNT 115 a 195 c 140 g 199 t  
 ORIGIN  
     1 ctggctgac atcggttca cttccaccac agtccccaaatgcgttgacatccaggc  
     61 gcagagcaat gccatcgactatcgaggctg catctcccgatgtatggatcatggttt  
 25 121 tggaggcata gacacatttc tcctcaccgtatggcttatgaccggatggccatcg  
     181 tcaccccttgtactaccctgtcattatgaa ccccccgcctgtggcctgc tggtcttgt  
     241 gtcctggttcctcagctgtcatactccctatccaggtctgtatgc tgcaatggc  
     30 301 cttttgcacc agtgggtca ttccagacttactgcgag ctgtcaggccctcacgt  
     361 tgcctgctca gacacacaca tcaattacat cctgcgtctac tggtgaccgccttctgg  
 35 421 ttttgtgccc ttctcaggaa tcctttctcctacacaccaa atttgtctccatctcgag  
     481 aatctcatcc acagatggaa aacacaaagtccttctaactgcggatctc atctgtctgt  
     541 gttttttta ttctatggaa caggcctggatgtatctt agttccaatgcgtccct  
     601 ttctggcggcgcgttgcgtatgttgcacactgtgttgcaccc (SEQ ID NO:79).

### 35 OR56

LOCUS AF127869 647 bp DNA PRI 28-FEB-2000  
 DEFINITION Macaca sylvanus MSY2 pseudogene, partial sequence.  
 ACCESSION AF127869  
 40 KEYWORDS .  
 SOURCE Barbary ape.  
 ORGANISM Macaca sylvanus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 45 Macaca.  
 REFERENCE 1 (bases 1 to 647)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
     reduction of function in primates  
 50 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 647)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 55 Montpellier Cedex 5 34396, France

**FEATURES**            **Location/Qualifiers**  
 source        1..647  
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               /db\_xref="taxon:9546"  
 5      gene       <1..>647  
               /gene="MSY2"  
               /pseudo  
**BASE COUNT**    131 a   173 c   137 g   206 t  
**ORIGIN**  
 10     1 cttcgttagac gtctgtttt tgccaccac tgcccaag atgctggta acatccagac  
       61 acagaacaaa gtcatcacat atgcaggctg catcagccag atgtgcattt tcataatttt  
       121 tgcaggattt gacacctta tgctgaccgt gatggcctac gacaggttt tgccatctg  
       181 tcaccctctg cactacacgg tcaccatgaa ccccaaggctc tgtggactgc tggttctggc  
       241 gtccgtatca tgagtgcctt gaattcttca ttgcaaagct taatggattt geaccttcc  
 15     301 ttctgtcgac acttgaaat tccccactt ttctgtgaac ttaatcggtt catccaccc  
       361 acctgttctg acactttct taatgacatg gtgtatgtt tgcagctgt gctgctgggt  
       421 gggggatgc tcattggat ccttactct tactctaaga tgcgtccctc tatacttgca  
       481 atctcatcg ttcagggaa gtacaaggca tttccacctt gtgcatctca cctctcggt  
       541 gtctccattt ttatgtaca atccttagtg tgtagcttgc accacagct  
 20     601 cacacgcaag tgctgcagtc tcggtgatgt acactgtgtt taccccc (SEQ ID NO:81).

## OR57

**LOCUS**    AF127870    649 bp    DNA            PRI    28-FEB-2000  
 25    **DEFINITION** Macaca sylvanus olfactory receptor (MSY4) gene, partial cds.  
**ACCESSION** AF127870  
**KEYWORDS** .  
**SOURCE**    Barbary ape.  
**ORGANISM** Macaca sylvanus  
 30    Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
       Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
       Macaca.  
**REFERENCE** 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 35    **TITLE** The olfactory gene repertoire in primates and mouse: evidence for  
       reduction of function in primates  
**JOURNAL** Unpublished  
**REFERENCE** 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 40    **TITLE** Direct Submission  
**JOURNAL** Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
       Montpellier Cedex 5 34396, France  
**FEATURES**            **Location/Qualifiers**  
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               /gene="MSY4"  
 CDS        <1..>649  
               /gene="MSY4"  
               /codon\_start=2  
               /product="olfactory receptor"  
               /translation="FIDICFVTTVPKMMVNQTQSRVITYAGCITQMCFFIFFVGLD  
               IFMLTVMAFDRFVAICHPLHYTVMNPRLSLLVLASWIMSALNSSLQSLIVLRLSFC  
 50      TDLEIPHFFCELNQVVHLACSDTFLNDMVMYLASALLGCGPLSGILYSYSKIVSSIRG

ISSAQGKYRAFSTCASHLSVSLFYGTLLGVYFSSAATRNSHSSAAASVMYTVVTP" (SEQ ID NO:83).

BASE COUNT 125 a 179 c 142 g 203 t

ORIGIN

5 1 cttcatagac atctgtttg tgtccaccac tgtcccaag atgatggtga acatccagac  
61 acagagcaga gtcatcacct atgcaggctg catcacccag atgtgcctt tcataatttt  
121 tggggactg gatatctta tgctgaccgt gatggcctt gaccggttt tggccatctg  
181 tcacccctcg cactacacgg tcaccatgaa ccccaaggctc agtgggcgtc tggttctggc  
241 gtcctggatc atgagtgcctc tgaattcgc ttacaatggc ttaatagtgc tgcggcttc  
10 301 ctctgcaca gacttgaaa tccccactt ttctgtgaa cttaatcagg tggcacct  
361 tgcctgtctc gacacccctt ttaatgacat ggtgtat tggcatctg cactgctgg  
421 ctgtggccc ctctctggga tcccttattc ttatctaag atcgttccct ccatacgtgg  
481 aatctcatca gctcaggggg agtacaggc atttccacc tgcacatctc acctctcagt  
541 tgcctccta ttatggta cgctccttagg agtgtacttt agtctgctg caacccgtaa  
15 601 ctcacactca agtgcgtcag ctcgggtat gtacaccgtg gttacccccc (SEQ ID NO:82).

## OR58

LOCUS AF127871 646 bp DNA PRI 28-FEB-2000

20 DEFINITION Macaca sylvanus olfactory receptor (MSY6) gene, partial cds.

ACCESSION AF127871

KEYWORDS

SOURCE Barbary ape.

ORGANISM Macaca sylvanus

25 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Macaca.

REFERENCE 1 (bases 1 to 646)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

30 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 646)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

35 TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

40 source 1..646

/organism="Macaca sylvanus"

/db\_xref="taxon:9546"

gene <1..>646

/gene="MSY6"

CDS <1..>646

/gene="MSY6"

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/product="olfactory receptor"

/translation="FTDLFFVTNTIPKMLVNLQSQNKAIYSAGCLTQLYFLVSLVALD

NLILAVMAYDRYVAICCPHYTTAMSPKLCILLSLCWVLSVLYGLIHTFLMTTVTFC

50 GSRKIHYIFCEMYVLLRLACSDTQINHTVLIATGCFIFLIPFGFMISYVLVRAILR  
IPSVSKKYKAFSTCASHLGVVSLFYGTLMVYLKPLHTYSVKDSVATVMYAVVTP" (SEQ ID NO:85).

BASE COUNT 134 a 196 c 126 g 190 t

ORIGIN

55 1 cttcaactgac ctcttcttg tcaccaaacac aatccccaaag atgctggtga acctccagtc

61 ccagaacaaa gccatctcct atgcaggggt tctgacacag ctctacttcc tggctccct  
 121 ggtggccctg gacaacctca tcctggctgt gatggcgat gaccgcgtat tggeccatctg  
 181 ctgcgccttc cactacacca cagccatag ccctaagtc tgcataatcc tccttcctt  
 241 gtgtgggtc ttatctgtgc tctatggct catacacacc ttccatcatga ccacgggtac  
 5 301 cttctgtgg tcacgaaaaa tccactacat cttctgttag atgtatgtat tgctgaggct  
 361 ggcattttcc gacactcaga ttaatcacac agtgcgtattt gccacaggct gctttatctt  
 421 ctcattcccc ttggattca tgcattttc tcatgtgttg atgtcagag ccattccctcag  
 481 aataccctca gtcctaaaga aatacaaagc ctatccact tgcctccc atttgggtgt  
 541 agtcccttc ttatggaa cacttcgtat ggtatactg aagccctcc atacactc  
 10 601 tgtgaaggac tcagtagcca cagtgtatg tgcgggtgt acaccc (SEQ ID NO:84).

## OR59

LOCUS AF127872 649 bp DNA PRI 28-FEB-2000  
 15 DEFINITION Macaca sylvanus olfactory receptor (MSY7) gene, partial cds.  
 ACCESSION AF127872  
 KEYWORDS  
 SOURCE Barbary ape.  
 ORGANISM Macaca sylvanus  
 20 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Macaca.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 25 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 30 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
 35 /organism="Macaca sylvanus"  
 /db\_xref="taxon:9546"  
 gene <1..>649  
 /gene="MSY7"  
 CDS <1..>649  
 40 /gene="MSY7"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="WVDICFSICIIPKMLVNIQTKNKTISYMDCLTQVYFSMFFPILD  
 TLLLTVMAYDRFAVCHPLHYVTIMNPRLCGLLVFVTWLIGVMTPLLHISLLTHLTFC  
 45 KDFEIPHFFCELTHILQLACSDTFLNSTLIYVMTGVLGVFPLLGIFSYRIASSIRK  
 MSSSGGKEKALSTCGSHLSIVSLFYGTGIGVHFTSAVTHSSQNISVASVMYTVVTP" (SEQ ID  
 NO:87).  
 BASE COUNT 129 a 190 c 127 g 203 t  
 ORIGIN  
 50 1 ctgggtgac atctgttca gcatctgcat catcccaag atgcgttgta acatccagac  
 61 caagaacaaa accatctt acatggactg cctcacccag gtctatttctt ccatgtttt  
 121 tcctattctg gacacgctac tcctgaccgt gatggcttat gaccgggttg tggccgtctg  
 181 ccacccctg cactatgtaa ccatcatgaa ccccgccctc tgccgcctcc tggttttgt  
 241 cacgtggctc attgggtgtca tgacaccctt cctccatatt tctctgtgtga cgcacatctaac  
 55 301 ctctgtaaa gattttgaaa ttccacattt ttctgcgaa ctgacacaca tcctccagct

361 ggcctgctct gataccttcc tgaacagcac gttgatataat gttatgacag gtgtgctggg  
421 cggtttccc ctccctggga tcattttctc ttattcacga atcgctcat ccataaggaa  
481 gatgtccca tctggggaa aagagaaagc actttctacc tgtggcttc acctctccat  
541 cgtttctta ttatggga caggcatgg ggtccattc acttctgcgg tgactcattc  
5 601 ttcccagaac atctccgtgg cctcggatgt gtacacgggt gtaccccc (SEQ ID NO:86).

## OR60

LOCUS AF127873 645 bp DNA PRI 28-FEB-2000  
10 DEFINITION Macaca sylvanus MSY8 pseudogene, partial sequence.  
ACCESSION AF127873  
KEYWORDS .  
SOURCE Barbary ape.  
ORGANISM Macaca sylvanus  
15 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Macaca.  
REFERENCE 1 (bases 1 to 645)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
20 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 645)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
25 TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
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30 /organism="Macaca sylvanus"  
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/gene="MSY8"  
/pseudo  
35 BASE COUNT 117 a 185 c 142 g 201 t  
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1 ctttgttac atctgtttta tctccaccac cgtcccccagg atgtgtatga acatccaggc  
61 atggagcaaa gacatctctt acgtgggtt cctcacttcg gtgtatttt taatgtatgtt  
121 tgctgaaat gatactttcc tactggccat gatggcctat gaccggtttg tggccatctg  
40 181 ccaccccttg cactacacgg tcatcatgaa cccctgcctc tggccatcc tggttctggc  
241 atctgttttcc atcattttat gggctccctt agttcatattt ctactgtatga agatgttgat  
301 ctccataggc actgagattc cgcatttttctt ctgtgaactt gtcagggtcc tcaagggtgcc  
361 cgctctgtata ctctctcgta taacattgtt ttgtatgtt ccacagact gctgggtgt  
421 ctccctgttag ctgggatctt ctctcttac ttcagatcg ttcctccctt aatgaggatg  
45 481 tcctccaccg agggcaatgtt caaaggctttt tcacccctgtt ggctcaccc tctgtgtggc  
541 tccttgttctt atggAACAGG acttgggggtt tatctcgatgtt ctgtgtgtac ccattttcc  
601 cagagcagctt ccatggccctc agtgtatgtac accatggtaa cccccc (SEQ ID NO:88).

## OR61

LOCUS AF127874 649 bp DNA PRI 28-FEB-2000  
50 DEFINITION Macaca sylvanus olfactory receptor (MSY9) gene, partial cds.  
ACCESSION AF127874  
KEYWORDS .  
SOURCE Barbary ape.

**ORGANISM** Macaca sylvanus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Macaca.  
**5 REFERENCE** 1 (bases 1 to 649)  
**AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
**TITLE** The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates  
**JOURNAL** Unpublished  
**10 REFERENCE** 2 (bases 1 to 649)  
**AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
**TITLE** Direct Submission  
**JOURNAL** Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
**15 FEATURES Location/Qualifiers**  
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 CDS <1..>649  
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     /codon\_start=2  
     /product="olfactory receptor"  
**25**      /translation="LADIGFTSTTVPKMLVNIQAQSNAlSYAGCISQMYFFMVFGGID  
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 TSWVIQHFYCELAQALTACSDTHINYILLYVVTGLGFVPFSGILFSYTQIVSSILR  
 ISSTDGKHAKFSTCGSHLSVVFLYGTGLGVYLSSNASSSWRGMVASVMYTVVTP" (SEQ  
 ID NO:90).  
**30 BASE COUNT** 114 a 196 c 140 g 199 t  
**ORIGIN**  
 1 ctggctgac atcggttca cttccaccac agtccccaaag atgctggta aatccaggc  
 61 gcagagcaat gccatcagct atgcaggctg catctcccaag atgtatttt tcattggtttt  
 121 tggaggcata gacacatttc tcctcaccgt gatggctat gaccggatag tggccatctg  
**35** 181 tcacccctg tactaccctg tcattatcaa ccccccgcctc tggtgcctgc tggttcctgt  
 241 gtcctggtc tcagactgt catactccct gatccagagt ctgttgatgc tgcagttgtc  
 301 ctttgcacc agttgggtca tttagcactt ttactgcggat ctgtcagg ccctcacgct  
 361 tgcctgctca gacacacaca tcaattacat cctgctctac gtggtgaccg gccttcgtgg  
 421 ttttgtgccct ttctcaggaa tcctttctc ctacacccaa attgtctct ccatctcgag  
**40** 481 aatctcatcc acagatggaa aacacaaagc tcatttcacc tgccggatctc atctgtctgt  
 541 ggttttttta ttctatggaa caggccttgg tggtgtatctt agttccaaatg catcgccctc  
 601 tcctggcgg ggcatggtgg cctcggtcat gtacactgtg gtacccccc (SEQ ID NO:89).

## OR62

**45 LOCUS** AF127875 649 bp DNA **PRI** 28-FEB-2000  
**DEFINITION** Callithrix jacchus olfactory receptor (CJA21) gene, partial cds.  
**ACCESSION** AF127875  
**KEYWORDS** .  
**50 SOURCE** Callithrix jacchus.  
**ORGANISM** Callithrix jacchus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
**REFERENCE** 1 (bases 1 to 649)  
**55 AUTHORS** Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 5 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 10 source 1..649  
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     /gene="CJA21"  
 15 CDS <1..>649  
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     /codon\_start=2  
     /product="olfactory receptor"  
     /translation="FVDICVTSTTLPKTLSNIQTHSKVITYAGCVTQLYFFVLFIGLD  
 20 SLLPTVMAYDRFVAICHPLHYTVIMNPQFCGLLVLVSWIMSALHSLTESLMVYPLLFC  
     TDLKIPQFFCEIHQIIQFACSDTFLNNLVMYLSTVLLGGGPLAGILYSYSKIASSIRA  
     ISSAEGKYKAFSTCASHLSVSLFYCTGLGVYLSSAATHSSLSSAAASVMYTVVTP" (SEQ ID  
     NO:92).  
 BASE COUNT 137 a 184 c 133 g 195 t  
 25 ORIGIN  
     1 ctttgtggac atctgtgtta cctccaccac acttccgaag acactgtcaa acatccagac  
     61 acacagcaaa gtcatcacct atgcaggctg cgtcacccag ttgtacttct ttgtacttct  
     121 catagggttt gacagcttac tcccgaccgt gatggcctat gaccggtttg tggccatctg  
     181 tcaccccttg cactacacgg tcatacatgaa ccctcagttc tggactgc tggacttctgg  
 30 241 gtccctggatc atgagtgcgcc tgcattttt gacagaaacg ttaatggat acccaactgt  
     301 cttttgtaca gacttggaaa tccccagggtt ttctgtgaa attcatcaga taattcaatt  
     361 tgcctgttct gacaccttcc ttaataacct ggtgatgtat ttgtcaactg tgcctctgg  
     421 cgggtggccc ctgtctggaa tcctgtactc ttactctaag atagcttctt ctatacgtgc  
     481 aatctcatca gctgaggggaa agtacaaggc atttccacc tggactgc acctctcagt  
 35 541 tgccttta ttttattgtta caggccctagg ggtgtacctg agtctgtg caacccacag  
     601 ctcactctca agcgcagcag ctcgggtat gtacacagtg gtcacccccc (SEQ ID NO:91).

### OR63

40 LOCUS AF127876 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Callithrix jacchus olfactory receptor (CJA22) gene, partial cds.  
 ACCESSION AF127876  
 KEYWORDS  
 SOURCE Callithrix jacchus.  
 45 ORGANISM Callithrix jacchus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 50 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
     reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 55 TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649  
 5 /organism="Callithrix jacchus"  
 /db\_xref="taxon:9483"

gene <1..>649  
 /gene="CJA22"

CDS <1..>649  
 10 /gene="CJA22"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="LVDICFTSTVPKILVNIQEWSGTISYAGCIAQMYFFMVFGGMD  
 TFLLTVMAYDRYVAICHPLSYPPVIVNPRLCGLLVSWFLSLSIQSLLMLRLSFC  
 15 TSWVIQHFYCELAQVLTLACSDTHVNYILLYMVTGLLGCVFSGILFSYIQIVSSILR  
 IPSTDGKHAKFSTCGSHLSVSLFYGTGLGVYLSSNASSSSWWGMVASAMYTVVTP" (SEQ

ID NO:94).

BASE COUNT 112 a 193 c 140 g 204 t

ORIGIN

20 1 ctgggttgc actgtttca cttccaccac agtccccaaatctggta acatccaggaa  
 61 gcagagtggt accatcagct atgcaggctg cattgcccgatgtatttttt tcatggtttt  
 121 tggaggcatg gacacatitc tcctcaactgt gatggctat gaccggatg tggtatctg  
 181 tcacccctgt tcctaccctgt tcattgtaaa ccccccgcctgt tgccgcctgt tggtcttgc  
 241 gtcctgggtc ctcagctgt catactccct gatccagagt ctgttgatgc tgccgcatac  
 25 301 ctctgcacc agtgggtca ttccagcacatttactgttag ctgcctagg ttctcacgc  
 361 tgctgtcaca gacacacatg tcaattacat ctgcgttac atggtgaccg gccttcgtgg  
 421 ctgtgtcccttc ttcctcaggga tcctttctc ctacatccaa attgtctctt ccatctcgag  
 481 aatcccatcc acagatggaa aacataaaacg cttttaccatgtggatctc atctgtctgt  
 541 ggtttcttta ttctacggga caggccttgg tgcctaccatgtccaaatg ctcgtccctc  
 30 601 ttccctggg ggcacatggcgttgc ctcagccat gtacacatgt gtcacccct (SEQ ID NO:93).

#### OR64

LOCUS AF127877 649 bp DNA PRI 28-FEB-2000

35 DEFINITION Callithrix jacchus olfactory receptor (CJA23) gene, partial cds.

ACCESSION AF127877

KEYWORDS .

SOURCE Callithrix jacchus.

ORGANISM Callithrix jacchus

40 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 45 reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

50 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649  
 55 /organism="Callithrix jacchus"  
 /db\_xref="taxon:9483"

gene <1..>649  
   /gene="CJA23"  
 CDS <1..>649  
   /gene="CJA23"  
   5 /codon\_start=2  
   /product="olfactory receptor"  
   /translation="FTDICFTTIVPRMLVNFLSGTKVIPYMGCLVQMYFFMAFGNTD  
   SYLLASMAIDRLVAICNPLHYDVAMNPRHCLLMLLGSCSISHLHSLFRVLLMSHLSFC  
   ASHVIKHFCDTQPVLKLSCSDTSSQMVMTETLAIVTPFLCIIFSYLRIITVLR  
 10 IPFAAGKWRAFSTCGSHLTVALFYGSIYYVYRPLSMYSVVKDRVATVMYTVVTP" (SEQ  
   ID NO:96).  
 BASE COUNT 126 a 192 c 139 g 192 t  
 ORIGIN  
   15 1 tttcacggat atctgcttca caacagtcat agtgcccagg atgcggta atttctatc  
   61 agggacaaggatgtatccct acatgggtcg cctgggtcaa atgtacttct tcattggccit  
   121 tgggaacact gacagctacc tgctggccct tatggccatc gacccggctgg tggccatctg  
   181 caacccctta cactatgatg tggctatgaa ccccccggcat tgcctactca tgctatgggg  
   241 tccttgacgatctccacc tacattccct gtccgggtg ctacttatgt ctacacgtc  
   301 ttcttgtgcc tccccacgtca ttaagcactt ttcttgtgac acccagectg tgctaaagct  
   361 gtcctgctct gacacgtccct ccagccatag ggtggcatg actgagactt tagtgtcat  
   421 tgtgacccccc ttcttgtgta tcatcttctc ctacctgca atcatcatca ctgtgctcag  
   481 aatccccctt ggacggatggaa agtggaggge ctctctacc tggctccc acctcactgt  
   541 agtagccctt ttctacggga gtatata tgcattttt aggccctgt ccatgtactc  
   601 agtggtaag gaccgagtag ccacagttat gtacacagta gtgacaccc (SEQ ID NO:95).  
 25

## OR65

LOCUS AF127878 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Callithrix jacchus olfactory receptor (CJA24) gene, partial cds.  
 30 ACCESSION AF127878  
 KEYWORDS .  
 SOURCE Callithrix jacchus.  
 ORGANISM Callithrix jacchus  
   35 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
   Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
   40 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 45 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
   source 1..649  
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   /db\_xref="taxon:9483"  
 50 gene <1..>649  
   /gene="CJA24"  
 CDS <1..>649  
   /gene="CJA24"  
   /codon\_start=2  
 55 /product="olfactory receptor"

/translation="FVDICFVSTTVPKMLVNIQTHSKVITFAGCITQIGHCLLFAVLD  
 VFMLTVMAYDRYVAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQTLIVLRLSFC  
 TDLEIPHFFCELNQVIHLACSDTFLNDVVMYLAAVLLGGGPLAGILYSYSKIVSSIRA  
 ISSAQGKYKAFSTCVSHILIVSLFYGTLLGVYLSSAATGNSHSRAAASVMYTVVTP" (SEQ ID  
 5 NO:98).  
 BASE COUNT 136 a 177 c 134 g 202 t  
 ORIGIN  
 1 cttttagac atctgtttg tgtctaccac tgcccaaag atgctggtaa atatccagac  
 61 acacagcaaa gtcatcacct ttgcaggctg catcacccag ataggccatt gcctactt  
 10 121 tgcatattt gacgcttta tgctgactgt gatggcctat gacggatg tggccatcg  
 181 tcacccactg cactacacag tcaccattaa cccagactg tggtggactgc tggctcg  
 241 atccctggatc ctgagtgcgc tgaattccctt attacaacc ttaatagtgc tgccgcttc  
 301 ctctgcaca gacttggaaa tccccactt ttctgcgaa ctaatcagg tcatccac  
 361 tgccctgttct gacactttc ttaatgatgt ggttgatgtat ttggccgctg tgctgtgg  
 421 ggggtggccccc ctgcaggaa ttctttactc ttactctaag atagtttccctt ccatacgtgc  
 481 aatctcatca gtcaggaa agtacaaggc attttccacc tggatctc acatctaatt  
 541 tgctcccta ttatggta cactcctagg tggatctt agttctgctg caactggcaa  
 601 ctcacattca agagctcgac ctcgggtat gtacactgt gtcacccccc (SEQ ID NO:97).

## 20 OR66

LOCUS AF127879 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Callithrix jacchus olfactory receptor (CJA25) gene, partial cds.  
 ACCESSION AF127879  
 25 KEYWORDS  
 SOURCE Callithrix jacchus.  
 ORGANISM Callithrix jacchus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
 30 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 reduction of function in primates  
 JOURNAL Unpublished  
 35 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 40 FEATURES Location/Qualifiers  
 source 1..649  
 /organism="Callithrix jacchus"  
 /db\_xref="taxon:9483"  
 gene <1..>649  
 45 /gene="CJA25"  
 CDS <1..>649  
 /gene="CJA25"  
 /codon\_start=2  
 /product="olfactory receptor"  
 50 /translation="FADICFTSTTVPKMLVDIQTQSKMITFAGCLTQIFFFVAFGCLD  
 NLLLTVMAYDRFVAICHPLHYAVIMNPRLCRLVLGSWCISVMVSLLETLTILRLSFC  
 TNMEIPHFFCDVLEVLKLACSETLVNKIVMYFVTIAMGVFPLSGILYSYSQIFSSILR  
 VSPAQGQHKAFSTCGSHLSVVTLFYGTGLGVYLSAATPSSRTSLMASVMYTMVTP" (SEQ  
 ID NO:100).  
 55 BASE COUNT 130 a 183 c 136 g 200 t

## ORIGIN

OR67

LOCUS AF127880 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Callithrix jacchus olfactory receptor (CJA26) gene, partial cds.  
 ACCESSION AF127880  
 KEYWORDS  
 SOURCE Callithrix jacchus.  
 ORGANISM Callithrix jacchus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
     reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
     Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..649  
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         /gene="CJA26"  
     CDS <1..>649  
         /gene="CJA26"  
         /codon\_start=2  
         /product="olfactory receptor"  
         /translation="LADIGLTSTTVPRTIVNIQTHSRVIAYSCLTQMSFSIFFVCME  
             DMLLAVMAYDRFVAICHPLHYPVIMSPRLCGFLVLVSAFLSLLISQVHNLIQLQFSCF  
             KDIKISNFFCDPSQLTLACSDTFVNNNIVMNF-AAVFGFLPISGIFLSYYKIVSSIL  
             RVPSSSGKYKAFSTCSSHLAVVCLFYGTVLGVYLGSVSSPRKRVVTSMYTVVTP" (SEQ  
 ID NO:102).  
 BASE COUNT 138 a 161 c 124 g 226 t  
 ORIGIN  
     1 ctggcgtac attggtttga cctccaccac cgtccccagg acaatttgta acattcaaac  
     61 tcacagcaga gtcatcgct atgcaagctg cctgcacacag atgtctttt caatctttt  
     121 tgtgtgtatg gaagacatgc tccttgctgt gatggcttat gaccggtttg tggccatctg  
     181 tcaccctcg cactatccag tcatcatgag cccacgactc tggcccttc tagtgttgtt  
     241 gtctgcctttt cttagccctttaatatccca ggtgcacaat ttgttgtct tacaatttc

301 ttgtttcaaa gatataaaga tttcttaattt ctcttgtac ccttc当地 ac tcctcacact  
 361 tgcttgtcc gacacgttg tcaataacaa catagtcatg aattttttt ctgtgttatt  
 421 tggttttctt cccatctcg ggtatctttt gtcttactat aaaaatgtttt cctccatctt  
 481 gagagtccca tcatcaagt ggaagtataa agccttcct acctgttagct ctcaccggc  
 5 541 agttgtttgc ttatttatg gaacagtctt tgaggtagtac ctgggtcat cagtgtcatc  
 601 ccccaggaag agagtggta cctcagatgt gtcacagtg gtcactccc (SEQ ID NO:101).

## OR68

10 LOCUS AF127881 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Callithrix jacchus olfactory receptor (CJA62) gene, partial cds.  
 ACCESSION AF127881  
 KEYWORDS .  
 SOURCE Callithrix jacchus.  
 15 ORGANISM Callithrix jacchus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 20 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
     reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 25 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
     Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..649  
 30        /organism="Callithrix jacchus"  
          /db\_xref="taxon:9483"  
     gene     <1..>649  
          /gene="CJA62"  
     CDS     <1..>649  
 35        /gene="CJA62"  
          /codon\_start=2  
          /product="olfactory receptor"  
          /translation="FVDICFVSTTVPKTLVNIQTHSKVITFAGCITQIGHCLLFAVLD  
           VFMLTVMAYDRYVAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQTLIVLRLSFC  
 40        TDLEIPHFFCVLNQVIHLACSDTFLNDVVMYLAVALGGGPLAGILYSYSKIVSSIRA  
           ISSAQGKYKAFSTCVSHILIVSLFYGTLLGVYLSAATGNHSRAAASVMYTVVTP" (SEQ ID  
     NO:104).  
 BASE COUNT 133 a 179 c 135 g 202 t  
 ORIGIN  
 45        1-ctttagac atctgtttt tgcgttccac tgcggcaag acgtggtaa atatccagac  
     61 acacagcaaa gtcacatccctt tgcaggctg catcaccccg ataggccatt gcctccctt  
     121 tgcgttccatgg gacgttttgc tgcgttccatgg gatggctat gacccgtatgg tggccatctg  
     181 tcacccactg cactacacag tcaccattaa cccagactg tgcgttccatgg tggccatctg  
     241 atccctggatc ctgaggcc tgaattccctt attacaaacc ttaatgtgc tgcggcttcc  
 50      301 ctctgcaca gacttggaaatcccttgc ttcgttccatgg tcaatcagg tcatccatctt  
     361 tgcctgttccatgg gacacttttgc ttaatgtgc tgcgttccatgg tggccatctg  
     421 ggggtggccctt ctgcggggatccatgg ttcgttccatgg tcaatcagg tgcgttccatgg  
     481 aatctcatca gctcaggggatccatgg ttcgttccatgg tcaatcagg tgcgttccatgg  
     541 tgcgttccatgg ttcgttccatgg tcaatcagg tgcgttccatgg tcaatcagg tgcgttccatgg  
 55      601 ctcacattca agagtcgttccatgg tcaatcagg tgcgttccatgg tcaatcagg tgcgttccatgg (SEQ ID NO:103).

OR69

LOCUS AF127882 649 bp DNA PRI 28-FEB-2000  
 5 DEFINITION Callithrix jacchus olfactory receptor (CJA80) gene, partial cds.  
 ACCESSION AF127882  
 KEYWORDS .  
 SOURCE Callithrix jacchus.  
 ORGANISM Callithrix jacchus  
 10 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 15 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 20 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
     Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
 25       /organism="Callithrix jacchus"  
       /db\_xref="taxon:9483"  
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       /gene="CJA80"  
 CDS <1..>649  
 30       /gene="CJA80"  
       /codon\_start=2  
       /product="olfactory receptor"  
       /translation="FTDICFTTIVPVRMLVNFLSETKVISYMGCLVPMYFFMAFANTD  
         SYLLASMAIDRLVAICNPLHYDVAMNSRRCLMLLGSCSISHLHSLSRVLMSRLSC  
         ASHVIKHFCDTQPVLKLSCSDTSSQMVVMTETLAVITPFLCIIFSYLRIIITVLR  
         IPSAAGKWRAFSTCGSHLTVALFYGSIIYVYFRPLSMYSVVKDRVATVMYTVVTP" (SEQ  
 35 ID NO:106).  
 BASE COUNT 123 a 194 c 139 g 193 t  
 ORIGIN  
 40 1 ttccacggat atctgcttca caacagtcat agtgcccagg atgctggta attttctatc  
   61 agagacaag gttatccct acatggctg cctggccca atgtacttct tcattggcc  
   121 tgccaaacct gacagctacc tgctggccctc tatggccatc gaccggctgg tgcccatctg  
   181 caaccctta cactatgtatggctatgaa ctcccgccgt tgccatctca tgctattgg  
   241 ttcttgccage atctccacc tacattccct gttccgggtg ctactttatg ctgcgcgtc  
   301 ttctgtgc tccccacgtca ttaaggactt ttctgtgac acccagccgt tgctaaagct  
   361 gtcctgtct gacacgtccct ccagccagat ggtggctatc actggagacct tagctgtat  
   421 tggccatccccc ttccctgtta tcatcttc tcatctgcga atcatcatca ctgtgctc  
   481 aatccctct gcaacggggaa agtggaggcc ctctctacc tggccccc acctcactgt  
   541 agtagccctt ttctacggga gtattttatgttgttttggccctgttccatgtactc  
   601 agtggtaag gaccggatgtt ccacacgttat gtacacagta gtgcacacc (SEQ ID NO:105).

QB70

55 LOCUS AF127883 649 bp DNA PRI 28-FEB-2000  
DEFINITION Callithrix jacchus olfactory receptor (CJA81) gene, partial cds.  
ACCESSION AF127883

KEYWORDS .

SOURCE Callithrix jacchus.

ORGANISM Callithrix jacchus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

5 REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates

10 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,

15 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..649

/organism="Callithrix jacchus"

/db\_xref="taxon:9483"

20 gene <1..>649

/gene="CJA81"

CDS <1..>649

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/codon\_start=2

25 /product="olfactory receptor"

/translation="FADICFTSTVPKMLVDIQTQSKMIFAGCLTQIFFVAFGCLD

NLLLTVMAYDRFVAICHPLHYAVIMNPRLCRLLVLSWCISVMVSLLTILRLSFC

TNMEIPHFFCDVLEVVLKACSETLVNKIVMYFVTIAMGVFPLSGILYSYSQIFSSILR

VSPAQGQHKAFSTCGSHLSVVTLYGTGLGVYLSSAATPSSRTSLMASVMYTMVTP" (SEQ

30 ID NO:108).

BASE COUNT 130 a 184 c 136 g 199 t

ORIGIN

1 ctttgctgac atctgcttca catccacgac cgtcccaaag atgctggtag atatccaaac

61 acaaagcaaa atgatcactt ttgcagggtg cctcacccag atttttttt tcgttgtcatt

35 121 tggatgcctg gacaatttgc tcttgaccgt gatggccat gaccgggtcg tggccatctg

181 tcacccccctg caactacggg tcatcatgaa ccccccggctc ttagactgc tagttctggg

241 gtcctggtagtca atcagtgtca tggtttctct gtcgagacc ttgaccattt tgaggctgtc

301 ctctgcaca aacatggaaa tcccacactt tttttgtat gttctcgaag tccctgaagct

361 cgccctgtctt gaaaccctcg tcaataaaat cgtgtatgtat tttgtgacaa ttgcaatggg

40 421 tgttttctct ctctctggaa tcctatactc ttatctcag attttctctt ccattctcgag

481 agtatcacctt gcccaaggccc agcacaaaacg ctttttccacc ttttttttttcc accctctcgat

541 ggtcaccctgt ttctatggca cggggccctgg ggttatatctc agttctcgag ctacaccatc

601 ttcttaggaca agtctgtatgg cctcggtatg gtacaccatg gtcacccccc (SEQ ID NO:107).

45 OR71

LOCUS AF127884 649 bp DNA PRI 28-FEB-2000

DEFINITION Callithrix jacchus olfactory receptor (CJA82) gene, partial cds.

ACCESSION AF127884

50 KEYWORDS .

SOURCE Callithrix jacchus.

ORGANISM Callithrix jacchus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

55 REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates  
 JOURNAL Unpublished  
 5 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille, Montpellier Cedex 5 34396, France  
 10 FEATURES Location/Qualifiers  
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     /organism="Callithrix jacchus"  
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 15      /gene="CJA82"  
 CDS      <1..>649  
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     /product="olfactory receptor"  
 20      /translation="FADICFTSTTVPKMLVGIQTQSKMITFAGCLTQIFFVAFGCLDNLLLTVMAYDRFVAICHPLHYAVIMNPRLCRLLVLSWCISVMVSLLETLTILRLSFCTNMEIPHFFCDVLEVLKLACSETLVNKIVMYFVTIAMGVFPLSGILYSYSQIFSSILRVSPAQGQHKAFTCGSHLSVVTLYGTGLGVYLSSAATPSSRTSLMASVMYTMVTP" (SEQ ID NO:110).  
 25 BASE COUNT 129 a 183 c 137 g 200 t  
 ORIGIN  
     1 ctttgctgac atctgttca catccacgac cgtcccaaag atgctgggtgg gtagccaaac  
     61 acaaaagcaaa atgatcactt ttgcagggtg cctcacccag atttttttt tcgttgatt  
     121 tggatgcctg gacaatttgc tcttgaccgt gatggcctat gaccgggtcg tggccatctg  
 30      181 tcaccccccgt cactacgcgg tcatacatgaa ccccccggcgc tgtagactgc tagttctgg  
     241 gtcctgggtc atcagtgtca tggtttcctt gtctcgagacc ttgaccattt tgaggctgc  
     301 ctctgcaca aacatggaaa tcccacactt tttttgtat gtctcgaag tccctgaagct  
     361 cgcctgtctt gaaaccctcg tcaataaaaat cgtgtatgtat ttgtgacaa ttgcaatggg  
     421 tggttttctt ctctctggaa tcttatactt ttatctctt ccattctcgat  
 35      481 agtatacactt gcccaaggcc agcacaaaat cttttccacc tgggggtctc acctctcgat  
     541 ggtcaccctgt ttctatggca cggggcttgg ggttatatctc agttctcgatc ctacaccatc  
     601 ttcttaggaca agtctgtatgg cctcggtatgtat gtacaccatgtat gtcacccccc (SEQ ID NO:109).

## OR72

40 LOCUS AF127885 658 bp DNA PRI 28-FEB-2000  
 DEFINITION Pongo pygmaeus PPY10 pseudogene, partial sequence.  
 ACCESSION AF127885  
 KEYWORDS  
 45 SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 REFERENCE 1 (bases 1 to 658)  
 50 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 658)  
 55 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
     Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 5     source    1..658  
       /organism="Pongo pygmaeus"  
       /db\_xref="taxon:9600"  
    gene      <1..>658  
       /gene="PPY10"  
 10     /pseudo  
 BASE COUNT 131 a 176 c 135 g 216 t  
 ORIGIN  
     1 ctgcctgac atcggttca cccggcat ggtcccaag atgattgtgg acatccaatc  
     61 tcacagcaga gtcattctt aggaggcta cctgactcg atgtctctt ttgcatttt  
 15     121 tggaggcgtg gaagagagac atgctctga gtgtgaaggc ctatgaccgg ttgttagcca  
     181 cctgtcaccc tctgtatcat tcagccatca tgaagtcatg ttctgtggc ttcttagttt  
     241 tgttgtctt tttttctc tcagttttt agacgccaa ctgcacaact tgattgcctt  
     301 gcaaattggcc tgctttgagg atgtggaaat ttctaatttc ttctgtgacc ctttcaact  
 20     361 ccccatctt catgttgta cagcttcacc gataacatca tcacgtatct ccctgacgcc  
     421 atatccccctt ttatcccattt ctcggggacc ctttctctta taatatcaaa ttgtttcctc  
     481 cattctgagg gcttcatcat caggtgggag gtataagcc ttctccatct gtgggtctca  
     541 cctgtcagt gtgttgtat ttatggaaac aggcatatgg gggtagtca gttcagatgt  
     601 gtcatcttcc ctgagaaagg ctgcagtgac ctcaatgt tacaccgtgg tcacccccc (SEQ ID NO:111).

## 25   OR73

LOCUS AF127886 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Pongo pygmaeus olfactory receptor (PPY11) gene, partial cds.  
 ACCESSION AF127886  
 30   KEYWORDS .  
 SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 35   REFERENCE 1 (bases 1 to 649)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE The olfactory gene repertoire in primates and mouse: evidence for  
         reduction of function in primates  
     JOURNAL Unpublished  
 40   REFERENCE 2 (bases 1 to 649)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE Direct Submission  
     JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
         Montpellier Cedex 5 34396, France  
 45   FEATURES Location/Qualifiers  
     source    1..649  
       /organism="Pongo pygmaeus"  
       /db\_xref="taxon:9600"  
    gene      <1..>649  
 50     /gene="PPY11"  
    CDS      <1..>649  
       /gene="PPY11"  
       /codon\_start=2  
       /product="olfactory receptor"  
 55     /translation="LADIGFTSTTVPKMIVDMQTHSRVISYAGCLTQMSFFVLFACMD"





LOCUS AF127889 660 bp DNA PRI 28-FEB-2000  
DEFINITION Pongo pygmaeus PPY50 pseudogene, partial sequence.  
ACCESSION AF127889  
KEYWORDS  
5 SOURCE orangutan.  
ORGANISM Pongo pygmaeus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
REFERENCE 1 (bases 1 to 660)  
10 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 660)  
15 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
20 source 1..660  
/organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"  
gene <1..>660  
/gene="PPY50"  
/pseudo  
25 BASE COUNT 122 a 181 c 146 g 211 t  
ORIGIN  
1 ctgcctgac atcagttca cctccaccac ggtcccaag atgattggg acatccaatc  
61 tcacagcaga gtcatctcct atgcaggctg cctgactcg atgtgtctcc tgcccattt  
121 tggaggcatg gaagagagac atgcctcta gtgtatggc ctatgagccg ttgttagccc  
181 tctgtcaccc tctatatacg tcaagccatct tgaaccccttg ttctgtggc ttccctgatt  
241 tgggtttt gttttttt tccctcgatct ttagactcc cagctcgca acttgtatcg  
30 301 ctacgcatg acctgcgttca aggatgttga aattcctaat ttcttctggg aacctctca  
361 actccccat cttacattt tgacacaccc tccaggtaac atccacatgt attccctcg  
421 tgccgtattt ggtttttcc ccatctcggg ggccctttc tcttacggta aaatgtttc  
481 ctccattctg agggttcat catcaggctgg gaagtatcaa ccttctccac ctgtgggtct  
541 cacctgtcatgg tttttgttgcgat attttacggaa acaggcgatgg ggggttagat  
601 gtgtcatccc ccccgagaaa gggtgcatgg gcctcagtga tgtacacgggt ggtcacccccc (SEQ ID NO:117).

#### 40 OR77

LOCUS AF127890 648 bp DNA PRI 28-FEB-2000  
DEFINITION Pongo pygmaeus PPY51 pseudogene, partial sequence.  
ACCESSION AF127890  
KEYWORDS  
45 SOURCE orangutan.  
ORGANISM Pongo pygmaeus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
REFERENCE 1 (bases 1 to 648)  
50 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 648)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

5 FEATURES Location/Qualifiers

source 1..648  
/organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"  
gene <1..>648  
10 /gene="PPY51"  
/pseudo

BASE COUNT 128 a 183 c 134 g 203 t

ORIGIN

1 cttingctgac atctgttttgc tgcactggcac tctaccaaag atgcgttga atatccagac  
15 61 acacagcaaa gtcacatcacat atgcaggcgt catcaccccg gtgtgccttt tcgtatttt  
121 tgcaggattt gacatcttc tcctgactgt gatggcctat gacgggttgtt ggccatctgt  
181 cacccccctgc actacacggt catcatgagc cccaggctct gtggactgtc ggttctggca  
241 tcctggatca tgagtgcctt gaattccctg ctacaaagct taatagtact gcgggtttcc  
301 ttctgcacag atttggaaat ccccccactt ttctgtgaac ttaatcaggat cacccacctt  
20 361 gctgttctg acacccttct taacgacatg gtgtatgtt tgcacatctgc gtgtggggc  
421 ggtgctcccc tcactggat cctttactct tactctaaga ttgttccctc catacgtcga  
481 atctcatcag ctcagggaaa gtacaaggcc tttccacct atgcgtctca cctctcagg  
541 gtctccattttatggatc actccttaggg gtgtaccta gtctgcgtc aaccacaaac  
601 tcataactcaa gtgtgcacg ctcggtgatg tacactgtgg tcacccccc (SEQ ID NO:118).

25

**OR78**

LOCUS AF127891 660 bp DNA PRI 28-FEB-2000

DEFINITION Pongo pygmaeus PPY52 pseudogene, partial sequence.

30 ACCESSION AF127891

KEYWORDS

SOURCE orangutan.

ORGANISM Pongo pygmaeus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

35 Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 660)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates

40 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 660)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

45 FEATURES Location/Qualifiers

source 1..660  
/organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"  
50 gene <1..>660  
/gene="PPY52"  
/pseudo

BASE COUNT 122 a 181 c 146 g 211 t

ORIGIN

55

1 ctgcctgac atcagttca cctccaccac ggtcccaag atgattgtgg acatccaatc

61 tcacagcaga gtcatctcct atgcaggctg cctgactcg atgtgtctcc tggccatttt  
 121 tggaggcatg gaagagagac atgtccctga gtgtatggc ctatgagccg ttgttagccc  
 181 tctgtcaccc tctatatcg tcaagccatct tgaaccctgtt ttctgtggc ttcttagatt  
 241 tgtggctttt gttttttttt tccctcgtct ttttagactcc cagtcgtcgca acttgtgc  
 5 301 cttacgcgtt acctgcgttca aggatgttga aattctaat ttctctggg aaccttctca  
 361 actccccat cttacatttt gtgacaccc taccagtaac atccacatgt atttccctgc  
 421 tgccgtatgtt gtttttttc ccatctcggtt ggccctttt tcttacgttaaa aatttgttcc  
 481 ctccatctgtt aggggttcat catcagggtgg gaagtatcaa ccttctccac ctgtgggtct  
 541 cacctgtcgtt tggtttgtt atttacggtaa acaggcggtt gagggttagct ggggtcagat  
 10 601 gtgtcatccc ccccgagaaa ggggtcgtt gcctcgttga tgcacacgggtt ggtcacccccc (SEQ ID NO:119).

## OR79

LOCUS AF127892 633 bp DNA PRI 28-FEB-2000  
 15 DEFINITION Pongo pygmaeus PPY76 pseudogene, partial sequence.  
 ACCESSION AF127892  
 KEYWORDS  
 SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
 20 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 REFERENCE 1 (bases 1 to 633)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 25 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 633)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 30 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..633  
 /organism="Pongo pygmaeus"  
 35 /db\_xref="taxon:9600"  
 gene <1..>633  
 /gene="PPY76"  
 /pseudo  
 BASE COUNT 134 a 155 c 124 g 220 t  
 40 ORIGIN  
 1 ctgcctgac attggttca cttggccac ggtccccaag atgattgttag acatgeaatc  
 61 acatagcaaa gtcatctccc atgcgggtgt tctgacacag atatctttt ttgtcccttt  
 121 tgcgtatata gatgacatgc tccctgactgt gatggccat tgcgtatcg tggccatctg  
 181 tcacccctgtt aactaccccg tcatcatgaa tccctcaccc tgcgtcttct tagtgttggt  
 241 gtcctttcc ttgcctgtt ggattcccg ctgcacaattt ggatgtttac aattcacctg  
 301 ctcagaatgtt gttttttttt tttttttttt tttttttttt tttttttttt tttttttttt  
 361 actgtgtcat cagtaacata ttcatacatt tagatagtagac aatactgggt tttttttttt  
 421 ttcaggatgtt tactataaaa ttgtggccctc cattctaaga atttttttttt  
 481 cagatggaa gttttttttt tttttttttt tttttttttt tttttttttt tttttttttt  
 541 ttatggaa acggcattttt tttttttttt tttttttttt tttttttttt tttttttttt  
 601 gtgtggcgtt tttttttttt tttttttttt tttttttttt tttttttttt tttttttttt (SEQ ID NO:120).

## OR80

LOCUS AF127893 648 bp DNA PRI 28-FEB-2000  
DEFINITION Pongo pygmaeus PPY77 pseudogene, partial sequence.  
5 ACCESSION AF127893  
KEYWORDS  
SOURCE orangutan.  
ORGANISM Pongo pygmaeus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
10 Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
REFERENCE 1 (bases 1 to 648)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
15 JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 648)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
20 Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..648  
/organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"  
25 gene <1..>648  
/gene="PPY77"  
/pseudo  
BASE COUNT 140 a 172 c 129 g 207 t  
ORIGIN  
30 1 ctttgctgac ctctgttta cctccacaac cgccccaaag atgctactga atatactgac  
61 acagaacaaa ttccatacat atgcaggctg tctcggtcag attttcttt tcacttcatt  
121 tggatgcctg gacaatttc tcttgaccgt gatggcctat gaccgttca tggccatctg  
181 tcacccctg cactacacac ggtcatcatg aaccaccaggc tctgtggact gctggttcta  
241 gggtcctagt gcatcagtgt catgggtccc tgctcaagac ctggactgtt tgaggctgt  
301 cctctgcaca aaatggaaaat tccacacttt ttttgtatc ttcttgaagt ctctgaagtc  
361 gcctgtctc acacccttcat caataacgtt gtgtatact ttgtcaactgg catcctgggt  
421 gtgtatccct tcactggaaat acttttctct tactataaaa ttgtttctc tataactgagg  
481 atttcctcag ctggagaaaaa gtgcaaaggc tttccacctt gttgtccca cctctcagtg  
541 gtcagcttgt tctatggcac aggttttggg gtctatctca gttctgcagc tacaccatct  
40 601 tcttaggacaa gtcgtggc ctcagtgtatc tacaccatgg ttaccccc (SEQ ID NO:121).

## OR81

LOCUS AF127894 660 bp DNA PRI 28-FEB-2000  
DEFINITION Pongo pygmaeus PPY78 pseudogene, partial sequence.  
45 ACCESSION AF127894  
KEYWORDS  
SOURCE orangutan.  
ORGANISM Pongo pygmaeus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
50 Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
REFERENCE 1 (bases 1 to 660)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
55

JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 660)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 5 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
     Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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 10     /db\_xref="taxon:9600"  
     gene <1..>660  
         /gene="PPY78"  
         /pseudo  
 BASE COUNT 118 a 185 c 140 g 217 t  
 15 ORIGIN  
     1 ctgcctgac atcggttca ctcaccac ggtcccaag atgattgtgg acatccaatc  
     61 tcacagcaga gtcatctcct atgcaggctg cctgactcg atgtgtctcc tgccatttt  
     121 tggaggcatg gaagagagac atgctctga gtgtatggc ctatgagccg ttgttagccc  
     181 tctgtcaccc tctatatcg tcaagccatct tgaacccgtg ttctgtggc ttcttagatt  
 20     241 tgtggcttt gttttcttt tcctcagtct tttagactcc cagctgcaca acttggattgc  
     301 cttagcgtat acctgctca aggatgtgaa aattcctaattt ttctctggg aaccttctca  
     361 actccccat cttacatttt ggacacccctt caccagtaac atccacatgt atttccctgc  
     421 tgccgtattt ggtttcttc ccatctcggtt ggccctttc tcttactgtaa aacttgttc  
     481 ctccattctg agggttcat catcagggtgg ggagttatcaa ccttctccac ctgtgggtct  
 25     541 cacctgtcag ttgttgctt attttatggaa acagccctgtt ggggttactt cagttcagct  
     601 gtgtccctt ctcaggaa gggtgcatgt gcctcagtga tgtacctggt ggtcaccccc (SEQ ID NO:122).

## OR82

30 LOCUS AF127895 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Pongo pygmaeus PPY85 pseudogene, partial sequence.  
 ACCESSION AF127895  
 KEYWORDS .  
 SOURCE orangutan.  
 35 ORGANISM Pongo pygmaeus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 40 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
     reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 45 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
     Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..649  
 50     /organism="Pongo pygmaeus"  
         /db\_xref="taxon:9600"  
     gene <1..>649  
         /gene="PPY85"  
         /pseudo  
 55 BASE COUNT 118 a 174 c 131 g 226 t

ORIGIN

1 cttggctgac atcagtttg cctctaccac ggtcccaag atgattgtgg acatccaggc  
61 tcacagcaga ctcatctt atgtggctg cctgactcgatgtcttt tgatcccttt  
121 cgcgtatgtt gaaagtctgc tcctgactgt gatggctat gaccggtttg aggccatctg  
5 181 tcacccctg cactccaaq tcatacagcg cccacgactc tgcgcctct tagttttgt  
241 gtcctttttt cttagccctt tgactctca gtcgcacaat ttgattgtt tacaactac  
301 ctgctcaat gatgtggaaa tctctaattt ttccctgtga ccctctcaa ctctcagcc  
361 tggctgtc tgacacctc attaataaca tggctgtata ttatattgtt gccatatttg  
421 gtttctccc tctcttaggg atcctttctt cttaataaa aattattctt tccattctgc  
10 481 gagttcgctc ttccaggaa aagtataag ccttctccac ctgcagctct cacctgtcag  
541 tggccctttt atttatggaa acagcccttg gagggtaacct cagttcagct ggtcccttt  
601 cctccaggaa gggtcagtg gcctcagtga tgtacctgtt ggtcaccccc (SEQ ID NO:123).

**OR83**

15

LOCUS AF127896 649 bp DNA PRI 28-FEB-2000  
DEFINITION Pongo pygmaeus olfactory receptor (PPY9) gene, partial cds.

ACCESSION AF127896

KEYWORDS .

20

SOURCE orangutan.

ORGANISM Pongo pygmaeus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 649)

25

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

30

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

35

source 1..649  
/organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"

gene <1..>649  
/gene="PPY9"

40

CDS <1..>649  
/gene="PPY9"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="FVDICFASTTVPKMLVNIQAQSKVITYAGCITQMYFFTHFVG LD

45

SFLLTVMAYDRFVAICHPLHYTVIMNPQLCGLLVLASWIMSVLHSLLQSLMVLRLSLC  
RELEIPHFFCELNQVIHLACSDTFLDDMVMYLAVALGGGCLAGILYSYSKIVSSICA  
ISSAQGKYKAFSTCASHLSVSLFYCTSLGVYLSSAAIHNSHSSAIASVMYTVVTP" (SEQ ID

NO:125).

50

BASE COUNT 136 a 173 c 140 g 200 t

ORIGIN

1 ctttgttagac atctgtttt cctctaccac ggtcccaag atgctggta atatccaggc  
61 acagagcaaa gtatcacct atgcaggctg catcacccag atgtactttt tcacacattt  
121 tgttaggattt gacagctcc tccttaactgt gatggctat gaccggtttg tggccatctg  
181 tcacccctg cactacacgg tcatacatgaa ccctcaactc tgcgcattgc tggttctggc  
55 241 gtcctggatc atgatgtct tgcattccctt attacaaagc ttaatggtc tgcgggttgc

301 cttatgcaga gagttggaaa tcccccaactt ttctgcgaa ctaatcagg tcatccacct  
361 tgccgtctc gacacctttc ttgatgacat ggtgtatgtat ttggcagctg tgctgcgtggg  
421 tgggggatgtt ctcgcgtggg tcccttactc ctactctaag atagtttccct ccataatgtgc  
481 aatctcatca gtcagaaggaa agtataaggc attttccacc tggtgcatttc acctctcagt  
541 tgtctcccttg ttttattgttta cgagccctagg agtgtacctt agctcggttg caatccaccaa  
601 ctcacactca agtgcaatag cctcgtgtat gtacaccgttg gtcacccccc (SEQ ID NO:124).

OR84

10 LOCUS AF127897 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Saimiri boliviensis olfactory receptor (SBO27) gene, partial cds.  
 ACCESSION AF127897  
 KEYWORDS .  
 SOURCE Bolivian squirrel monkey.  
 ORGANISM Saimiri boliviensis  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 20 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
     reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 25 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
     Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 30 source 1..649  
     /organism="Saimiri boliviensis"  
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 CDS <1..>649  
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     /product="olfactory receptor"  
     /translation="LVDFCLATDTIPKMLVSLQTRSKAISYPCCLTQMYFFHFFGIVD  
         SVLIAVMAYDRFVAICHPLHYATIMSPRLCGLLVGAPWVFSCFISLTHILLMARLVFC  
         GSLKVPHYLCDLPIRLSCTDTSVRIFLTVAGMVIATPFICILASYACILVAIMK  
         IPSAGGRKKAFSTCSSHLSVVALFYGTTIGVYLCPSSVHTAVKEKASAVMYTVVTP" (SEQ ID  
 35 NO:127).  
 BASE COUNT 112 a 218 c 145 g 174 t  
 ORIGIN  
 45 1 cctgggtat ttctgtctgg ccacccgacac catccccaaag atgctggtga gcctcaaac  
     61 caggagcaag gccatctttt atccctgtcg cctgaccaggat atgtacttct tccattttt  
     121 tggeatcgat gacagcgctt taattgcgtt aatggcgat gaccgtttt tggecatctg  
     181 ccaccccttg cactacgcca cgtatcgatgg cccacccctc tggtccctgc tggtcggggc  
     241 cccctgggtt tttcatgtct ccatctcaat caccacatc ctccatgtgg cccgcctcg  
     301 ttctgcggc agcctcaagg tgcctattt ctgtgcgcac ctcaatccca tcctccgact  
     361 ttctgtgcaca gacacgtcg tgaacaggat ttcatcttc actgtggcag ggatggtgat  
     421 agccacgccc ttcatctgc tccatggcctc ctatgcgttc atccatgttag ccatacatgaa  
     481 gatcccccttct cggatggca ggaagaagc ctctccacc tgcagctcc acctgtccgt  
     541 ggttgtcttc ttcatggaa ccaccatgg ggtctaccctg tgccatctt cggtcccac  
     601 cgctgttaag gagaaagctt ctgtgtat gtacacagta gtcacccccc (SEQ ID NO:126).

## OR85

LOCUS AF127898 646 bp DNA PRI 28-FEB-2000  
5 DEFINITION Saimiri boliviensis olfactory receptor (SBO28) gene, partial cds.  
ACCESSION AF127898  
KEYWORDS  
SOURCE Bolivian squirrel monkey.  
ORGANISM Saimiri boliviensis  
10 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
REFERENCE 1 (bases 1 to 646)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
15 reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 646)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
20 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
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/organism="Saimiri boliviensis"  
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gene <1..>646  
/gene="SBO28"  
CDS <1..>646  
/gene="SBO28"  
30 /codon\_start=2  
/product="olfactory receptor"  
/translation="LADIGFTSTTVVRTIVNIQTHSRVIAYASCLTQMSFSIFFACME  
DTLLAVMAYDRFVAICHPLHYPVIMNPRLCGFLVLVSFVFLSLLISQVHNLLVLFSCF  
KEIKISNFFCDPSQLTLSCSDTFVNNIVTNFFAAVFGFLPISGIFFSYYKIAPSILR  
35 VPLSSGKYKAFSTCSSHLAVVCLFYGTIVGVYLGSSMASPRKSVVASVMYTVVTP" (SEQ ID  
NO:129).  
BASE COUNT 137 a 167 c 122 g 220 t  
ORIGIN  
40 1 ctggctgac attggttca cctccaccac agtccccagg acaattgtga acattcaaac  
61 tcacagcaga gtcatgcct atgcgagctg cctgacacag atgtctttt caatatttt  
121 tgcgtgtatg gaagacacgc tcctggctgt gtatggctat gaccgggttg ttgccatctg  
181 tcacccctcg cactacccag tcatacatgaa cccacgactc tggtggctct tagtgtgg  
241 gtctgtttt cttagccccc taatatccca ggtgcacaat ttgtttgtct tacaattttc  
301 ttgcctcaaa gagataaaga ttcttaattt ctctgtgac cttctcaac ttccatccct  
361 ttcttgttct gacacccttg tcaataacat agtcacaaat ttcttgtctg ctgtatttgg  
421 ttcttccccc atctcaggaa ttctttctc ttactataaa attgccccct ccattctgag  
481 agttccattt tcaagtggga agtataaagg ttctccacc tttagcttc acctggcagt  
541 tttttgccta ttatggaa cagtcattgg agtgcaccc ttggcatcaa ttggatcccc  
601 caggaagagt gtggggcctt cagtgatgtt cacagttttt actccc (SEQ ID NO:128).  
50

## OR86

LOCUS AF127899 649 bp DNA PRI 28-FEB-2000  
55 DEFINITION Saimiri boliviensis olfactory receptor (SBO29) gene, partial cds.  
ACCESSION AF127899

KEYWORDS .

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

5 REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates

10 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,

15 Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

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/organism="Saimiri boliviensis"

/db\_xref="taxon:27679"

20 gene <1..>649

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CDS <1..>649

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25 /product="olfactory receptor"

/translation="FVDICFVSTTVPKMLVNIQTHSKVITFAGCITQIGHCLLFAALD

IFMLTVMAYDRYVAICHPLHYTVTINPRLCGLLVLASWILSANSSLQTLIVLRLSFC

TDLEIPRFFCELNQVIHLACYDTFLNDVVMYLAAMLLGGGPLTGIYSYSKIVSSIRA

ISSAQGKYKAFSTCASHILIVSLFYGTLLGVYLSAATGNSHSGAAALVMYTVVTP" (SEQ ID

30 NO:131).

BASE COUNT 138 a 177 c 133 g 201 t

ORIGIN

1 ctttgttagac atctgttttgcgttaccac tgcccgaaatgctggtaaatccagac

61 acacagcaaa gtcacatcaccttgcaggctgtcatcaccaggataggccattgcctactctt

35 121 tgcagcatttgcacatcttgcgtgactgtatggcctatgaccggatgttgccatctg

181 tcacccctgtcaaacatcagatcaccattaaccccagactgttggactgttggtctggc

241 atccctggatctgagtgccctgaattcccttattacaaccattaaatgtc tgccgtttc

301 ctctgcaca gacttggaaa tcccccgcttttctgcgaa cttaatcagg tctatacatct

361 tgcctgttatgacactttcccttaatgtatgttgcgttatgttgcgtctgtgtctggg

40 421 cgggtgtcccctcacaggaa ttatattacttactctaagatgttccctccatcgtgc

481 aatcttcata gtcaggaggaa agtacaaggcgtttccaccgttgcgttcacatcttaat

541 tgtctctta tttatgttcaactcctagg tttgttacatttttgcgttcaactggcaa

601 ctcacattca ggtgctgcagccttggatgttacactgtgtcaccctcc (SEQ ID NO:130).

45 OR87

LOCUS AF127900 649 bp DNA PRI 28-FEB-2000

DEFINITION Saimiri boliviensis olfactory receptor (SBO30) gene, partial cds.

ACCESSION AF127900

50 KEYWORDS .

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

55 REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates  
 JOURNAL Unpublished  
 5 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille, Montpellier Cedex 5 34396, France  
 10 FEATURES Location/Qualifiers  
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     /organism="Saimiri boliviensis"  
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 15      /gene="SBO30"  
 CDS <1..>649  
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     /product="olfactory receptor"  
 20      /translation="FVDICFVSTTVPKMLVNIQTHSKVITFADCITQIGHCLLFAALD  
         IFMLTVAMYDRYVATCHPLHYTVTINPRLCGLLVLASWILSALNSSLQPLIVLRLSFC  
         TDLEIPHFFCELNQVIHLACYDTFLNDVVMYLAAMLLGGGPLTGIYSYSKIVSSIRA  
         ISSAQGKYKAFSTCASHILIVSLFYGTLLGVYLSSAATGNSHSSAAALVMYTVVTP" (SEQ ID NO:133).  
 25 BASE COUNT 141 a 179 c 130 g 199 t  
 ORIGIN  
     1 ctttgtagac atctgtttt tgcttaccac tgcccgaaatgatggtaatccagac  
     61 acacagcaaa gtcatcacct ttgcagactg catcacccatgatggcattgcctacttt  
     121 tgccatggatg gacatctta tgctgactgtatggccatgaccggatggccacatgg  
 30      181 tcacccctg cactacacag tcaccaattaccccaactgttggtactgttggtctggc  
     241 atccctggatc ctgaggccccc tgaattccctt attacaaccc ttaatagtgc tgccgccttc  
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     361 tgccctgttat gacactttcc ttaatgtatgtatggcagactgttgctgtgg  
     421 cggctggccccc ctcacaggaa ttatatttttactttaatgtatgtatggcagactgttgctgtgg  
 35      481 aatcttcata gtcacaggaa agtacaaggatgttccacc ttttccatc acatctttaat  
     541 tggctccatc ttatgtatgtatggcagactgttgctgtgg  
     601 ctcacatca agtgctgcag ccttggatgtatggcagactgttgctgtgg (SEQ ID NO:132).

## OR88

40 LOCUS AF127901 649 bp DNA PRI 28-FEB-2000  
 DEFINITION Saimiri sciureus olfactory receptor (SSC31) gene, partial cds.  
 ACCESSION AF127901  
 KEYWORDS .  
 45 SOURCE common squirrel monkey.  
 ORGANISM Saimiri sciureus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 649)  
 50 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 55 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
     Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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 10    CDS      <1..>649  
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 15           IFMLTVMAYDRYVAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQLTLIVLRLSFC  
       TDLEIPHFFCELNQVIHLACYDTFLNDVVMYLAAMLLGGGPLTGIYSYSKIVSSIRA  
       ISSAQGKYKAFSTCASHILIVSLFYGTLLGVYLSSAATGNSHSSAAALVMHTVVTP" (SEQ ID  
       NO:135).  
 BASE COUNT   141 a   178 c   131 g   199 t  
 20    ORIGIN  
       1 cttttagac atctgtttt tgcttaccac tgcccaag atgctggtaa atatccagac  
       61 acacagcaa gtcatcacct ttgcaggctg catcacccag ataggccatt gcctacttt  
       121 tgccaggatc gacatctta tgctgactgt gatggctat gaccggatg tggccatctg  
       181 tcacccctcg cactacacag tcaccattaa ccccaagactg tgccggactgc tggtctggc  
 25    241 atccggatc ctgagtggcc tgaatttcctt attacaacc ttaatagtgc tgccgtttc  
       301 ctctgcaca gacttgaaa tccccactt ttctcgaa cttaatcagg tcatacatct  
       361 tgccgttat gacatttc ttaatgtat ggtgtatgat ttgcagacta tgctgctggg  
       421 cgggtgtccc ctcacaggaa ttatctactc ttactctaag atagtttcctt ccatacgtgc  
       481 aatctcatca gctcaggggaa agtacaaggc gtttccacc tgcgtatc acatcttaat  
 30    541 tgctccita tttatggta cactcctagg tggtgtaccctt agtctgtcgta caactggcaa  
       601 ctcacattca agtgctgcag ccttggat gcacacatgt gtcacccccc (SEQ ID NO:134).

## OR89

35   LOCUS AF127902 646 bp DNA       PRI   28-FEB-2000  
 DEFINITION Saimiri sciureus olfactory receptor (SSC32) gene, partial cds.  
 ACCESSION AF127902  
 KEYWORDS  
 SOURCE common squirrel monkey.  
 40   ORGANISM Saimiri sciureus  
       Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
       Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 646)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 45   TITLE The olfactory gene repertoire in primates and mouse: evidence for  
       reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 646)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 50   TITLE Direct Submission  
 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
     Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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       /organism="Saimiri sciureus"

gene /db\_xref="taxon:9521"  
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 gene="SSC32"  
 CDS <1..>646  
 5 gene="SSC32"  
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 DTLAVMAYDRFVAICHPLHYPVIMNPRLCGFLVLVSVFLSLLISQVHNLLVLFSCF  
 10 KEIKISNFFCDPSQLLTLCSDTFVNNTVNFFAAVFGFLPISGIFFSYYKIASSILR  
 VPLSSGKYKAFSTCSSHLAVVCLFYGTIVGVYLGSSMASPRKSVVVASVMYTIVVTP" (SEQ ID  
 NO:137).  
 BASE COUNT 135 a 166 c 123 g 222 t  
 ORIGIN  
 15 1 ctggctgac attggttca cttccaccac agtccccagg acaatttgaa acattcaaac  
 61 tcacagcaga gtcatcgct atgcgagctg cctgacacag gtgtctttt caatctttt  
 121 tgcgtgtatg gaagacacgc tccctggctgt gatggcctat gaccgggttg ttgccatctg  
 181 tcacccctg cactacccag tcatcatgaa cccacgactc tgfgcctct tagtgtgg  
 241 gtctgtttt cttagccctt taataatccca ggtgcacaat ttgattgtct tacaatttt  
 20 301 ttgttcaaa gagataaaga ttcttaattt ctctctgtac cccttcacac ttctccaccc  
 361 ttcttgcctt gacacccctt tcaataaacat agtcacgaat ttctttgcgt ctgtatttg  
 421 ttcttcctcc atctcaggga tcttttctc ttactataaa attgctctt ccattctgag  
 481 agttccattt tcaagtggga agtataaaggc ttctccacc tgtagctctc acctggcagt  
 541 tgtttgccta ttatggaa cagttattgg agtgtacctt gggtcatcaa tgccatcccc  
 25 601 caggaagagt gtggtggcct cagtgatgta cacatggc actccc (SEQ ID NO:136).

## OR90

LOCUS AF127903 649 bp DNA PRI 28-FEB-2000  
 30 DEFINITION Saimiri sciureus olfactory receptor (SSC33) gene, partial cds.  
 ACCESSION AF127903  
 KEYWORDS  
 SOURCE common squirrel monkey.  
 ORGANISM Saimiri sciureus  
 35 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory gene repertoire in primates and mouse: evidence for  
 40 reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 45 JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
 Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..649  
 50 /organism="Saimiri sciureus"  
 /db\_xref="taxon:9521"  
 gene <1..>649  
 gene="SSC33"  
 CDS <1..>649  
 55 /gene="SSC33"  
 codon\_start=2



BASE COUNT 136 a 167 c 122 g 221 t  
ORIGIN  
1 ctggctgac attggttca cctccaccac agtccccagg acaattgtga acattcaaac  
5 61 tcacagcaga gtcatcgct atgcgagctg cctgacacag atgtctttt caatctttt  
121 tgcgttatg gaagacacgc tcctggctgt gatggctat gaccggttg ttgccatctg  
181 tcacccctcg cactaccccg tcatacatgaa cccacgactc tggtggctct tagtgtgtt  
241 gtctgtttt cttagcctttaataatccca ggtgcacaat ttgttgtct tacaaatttc  
301 ttgctcaaaa gagataaga ttctcaattt ctctgtgac cttctcaac tccctaccct  
361 tcttgtct gacacccctt ctaataacat agtcacgaat ttcttgctg ctgtattgg  
10 421 tttcttccc atctcaggga tcttttctc ttactataaa attgectct ccattctgag  
481 agttccatta tcaagtggga agtataaage ttctccacc tgtagetctc acctggcagt  
541 ttttgctta ttttatggaa cagtcattgg agtgtacctt gggcatcaa tggcattcccc  
601 caggaagagt gtggccct cagtgatgtacacatggc actccc (SEQ ID NO:140).

15 **OR92**

LOCUS AF127905 649 bp DNA PRI 28-FEB-2000

DEFINITION Saimiri boliviensis SBO64 pseudogene, partial sequence.

ACCESSION AF127905

20 KEYWORDS

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

25 REFERENCE 1 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory gene repertoire in primates and mouse: evidence for reduction of function in primates

JOURNAL Unpublished

30 REFERENCE 2 (bases 1 to 649)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille, Montpellier Cedex 5 34396, France

35 FEATURES Location/Qualifiers

source 1..649

/organism="Saimiri boliviensis"

/db\_xref="taxon:27679"

gene <1..>649

/gene="SBO64"

/pseudo

BASE COUNT 145 a 157 c 129 g 218 t

ORIGIN

1 ctgtcgat ttctgttatt ccaccaccgt tataccaaa ctgtggaga acttgggttgc  
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121 tgtggatca gaaatattca tgctggcagt gatggctat gacagattt tggtgggtgc  
181 ttaccctctg ctctcacacag ttgcaatgtc ccagaggctt ttctttttgt tagtggctac  
241 atcatacttc agggtgacag tctgttttcc gacaattacc ttcttcctcc tggattttt  
301 cttcagaggaa aataatatca ttaataactt tggtgtgag cctgtgtcca ttgttgtct  
50 361 gccatgtttt gacccttaca tgagccaggaa aatcattttc atttctgtcca ctttcaatga  
421 aacaaggcgc ctgtatgtca ttctcacctc ctaagatttc ttgtttatca atgtcatgt  
481 gatgccttc actggggggc gcataaaagc atgcgacacc tggtccccc agctgaccgc  
541 cattatcatt ttccatggga ccatctttt tctctattgt ttctcaact cccaaagttc  
601 atggctcatgtcagtgatgttacacatgt gtcatcccc (SEQ ID NO:142).

55

## OR93

LOCUS AF127906 649 bp DNA PRI 28-FEB-2000  
DEFINITION Saimiri boliviensis olfactory receptor (SBO65) gene, partial cds.  
5 ACCESSION AF127906  
KEYWORDS .  
SOURCE Bolivian squirrel monkey.  
ORGANISM Saimiri boliviensis  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
10 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory gene repertoire in primates and mouse: evidence for  
reduction of function in primates  
15 JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
20 Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
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25 gene <1..>649  
/gene="SBO65"  
CDS <1..>649  
/gene="SBO65"  
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30 /product="olfactory receptor"  
/translation="FVDICVTSTIPKTLSNIQTHSKVITYAGCVTQLYFSVLFIGLD  
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TDLKILHFFCELNQIIHIACSDTCLNNLVMYLSAVLLGGGPLAGILYSYSKIASSIRA  
ISSAKGKYKAFSTCASHLSVVSLFYCTGLGVYLSSAATHNSLSSTAASVMYTVVTP" (SEQ ID  
35 NO:144).  
BASE COUNT 141 a 180 c 130 g 198 t  
ORIGIN  
1 ctttgttagac atctgtgtta cctccaccac gattccaaag acactatcaa acatccagac  
61 acacagcaaa gtcacatcac ttgcaggctg tggcaccatgg ttgtactttt ctgtactctt  
40 121 tatagggttg gagacgttac tcctgaccgt gatggctat gaccgattt tgcccatctg  
181 tcaccccttg cgctacatgg tcatacatggaa ccctcagctc tggggactgc tgggtctgg  
241 gtcctggatc atgagtgcctc tgcatccctt gacagaaaagc ttaatggcat tatcactgt  
301 ctttgtaca gacttgaaaaa tcctccactt ttctgtgaa cttaaatcaga taatccacat  
361 tgccctgttct gacacctgtc ttaataaacct ggtgtat ttttcagctg tgctgctgg  
45 421 cgggtggctt ctgcgtggaa tcctgtatc ttactctaag atagcttcctt ctatcgtgc  
481 aatctcatca gctaaggaaa agtacaaggc atttccacc tggcatatc acctctcgt  
541 tggctcccta ttttatgtt cagggctagg ggtgtatcg agtctgtg caacccacaa  
601 ctcaactctca agtacagcag cctcggtat gtacactgtg gtcaccccc (SEQ ID NO:143).

## 50 OR94

LOCUS AF127907 649 bp DNA PRI 28-FEB-2000  
DEFINITION Saimiri sciureus olfactory receptor (SSC69) gene, partial cds.  
ACCESSION AF127907  
55 KEYWORDS .

SOURCE common squirrel monkey.  
 ORGANISM Saimiri sciureus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Platyrhini; Cebidae; Cebinae; Saimiri.  
 5 REFERENCE 1 (bases 1 to 649)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE The olfactory gene repertoire in primates and mouse: evidence for  
         reduction of function in primates  
     JOURNAL Unpublished  
 10 REFERENCE 2 (bases 1 to 649)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE Direct Submission  
     JOURNAL Submitted (17-NOV-1999) IGH, CNRS UPR, 141 rue dec la Cardonille,  
         Montpellier Cedex 5 34396, France  
 15 FEATURES Location/Qualifiers  
     source 1..649  
         /organism="Saimiri sciureus"  
         /db\_xref="taxon:9521"  
     gene <1..>649  
 20       /gene="SSC69"  
     CDS <1..>649  
         /gene="SSC69"  
         /codon\_start=2  
         /product="olfactory receptor"  
 25       /translation="FVDICFVSTTVPKMLVNIQTHSKVITFAGCITQIGHCLLFAALD  
         IFMLTVMAYDRYVAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQPLIVLRLSFC  
         TDLEIPHFFCELNQVIHLACYDTFLNDVVMYLAAMLLGGPLTGIYSYSKIVSSIRA  
         ISSAQGKYKAFSTCASHILIVSLFYGTLLGAYLSSAATGNHSSAAALVMYTVVTP" (SEQ ID  
     NO:146).  
 30 BASE COUNT 139 a 179 c 131 g 200 t  
 ORIGIN  
     1 ctttgttagac atctgttttgcgttaccac tgcccgaaatgctggtaaatccagac  
     61 acacagcaaa gtcacccatgttgcaggctgtcatccccatgtatggcattgcctacttt  
     121 tgcaggatgttgcgttaccatgtatggcattgtatggctatgtatggcatatgt  
 35       181 tcacccctgttgcgttaccatgtatggcattgtatggctatgtatggcatatgt  
     241 atccgtggatgttgcgttaccatgtatggcattgtatggctatgtatggcatatgt  
     301 cttctgcaca gacttggaaa tcccccttttgcgttaccatgtatggcattgtatgg  
     361 tgcctgttatgacactttcc ttaatgtatgtatggcattgtatggcattgtatgg  
     421 cgggtggcccttcacagggaa ttatgtatgtatggcattgtatggcattgtatgg  
 40       481 aatctcatca gtcaggggaa agtacaagggtttccaccatgtatggcattgtatgg  
     541 tgcgttaccatgtatggcattgtatggcattgtatggcattgtatggcattgtatgg  
     601 ctcacattca agtgcgtcag ccttggatgtatgtatggcattgtatggcattgtatgg  
         (SEQ ID NO:145).

## OR95

45 LOCUS AF179716 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Papio hamadryas olfactory receptor (PPA133) gene, partial cds.  
 ACCESSION AF179716  
 KEYWORDS  
 50 SOURCE baboon.  
 ORGANISM Papio hamadryas  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
     Papio.  
 55 REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
5 REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
10 FEATURES Location/Qualifiers  
source 1..487  
/organism="Papio hamadryas"  
/db\_xref="taxon:9557"  
gene <1..>487  
15 /gene="PPA133"  
CDS <1..>487  
/gene="PPA133"  
/codon\_start=2  
/product="olfactory receptor"  
20 /translation="VAICFPLHYTAIMSPMLCLALVALSWVLTFHAMLHTLLMARLC  
FCADNVIPHFFCDMSALLKLACSDTRVNELVIFIMGGILVIPFLILGSYARIVSSI  
LKVPSKGICKAFSTCGSHLSVSLFYGTIIGLYFCPSANSSTLKETVMAMMYTVVTP  
ML" (SEQ ID NO:148).  
25 BASE COUNT 82 a 141 c 107 g 157 t  
ORIGIN  
1 tgtggccatc tgccatcccccc tgcaaacac cgccatcatg agccccatgc tctgtctcg  
61 cctgggtggcg ctgtccctggg tgctgaccac ctccatgcc atgttacaca ctttactcat  
121 ggccaggttg tgtttttgtg cagacaatgt gatccccac ttttctgtg atatgtctgc  
181 tctgctgaag ctggcctgtct ctgacactcg agtcaatgaa ttggtgatat ttatcatgg  
241 agggctgatt ctggcatcc cattccatctt catccatggg tccatgtcac ggtatgtctc  
30 301 ctccatcttc aagggtccctt cgtctaagggt tatctgcaag gcggtctcta ttgtggctc  
361 ccacccctctt gtgggtgtcac tggctatgg gaccattatt ggtctctact tctgcccattc  
421 agctaataatgt tctactctaa aggagactgt tatggctatg atgtacactg ttggtgacccc  
481 catgctg (SEQ ID NO:147).  
35

## OR96

LOCUS AF179717 486 bp DNA PRI 31-DEC-2000  
DEFINITION Papio hamadryas olfactory receptor (PPA134) gene, partial cds.  
40 ACCESSION AF179717  
KEYWORDS  
SOURCE baboon.  
ORGANISM Papio hamadryas  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
45 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Papio.  
REFERENCE 1 (bases 1 to 486)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
50 Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 486)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
55 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..486  
   /organism="Papio hamadryas"  
 5   /db\_xref="taxon:9557"

gene <1..>486  
   /gene="PPA134"

CDS   <1..>486  
   /gene="PPA134"  
 10   /codon\_start=2  
   /product="olfactory receptor"  
   /translation="VAICQPLHYSTLLSPWACMAMVGTSWLTGIIATTHAFLIFSLP  
   FPSRPIPHFLCDILPVRLASAGKHRSEISVMTATVVFIMIPFSLIVTSYIRILGAI  
   LAMASTQSRRKVFSTCSSHLLVVSLFFGTASITYIRPQAGSSVTTDRVLSVFYTVTP  
 15   ML" (SEQ ID NO:150).

BASE COUNT 85 a 181 c 97 g 123 t

ORIGIN

1 tggccatc tgccagectc tgcactactc taccctcttg agcccatggg cctgcattggc  
 61 catggggcc accctctggc tcacaggcat catcacggcc accacccatg ctttcctcat  
 20 121 ttctctcta cccttccca gccgccccat catcccacac ttctctgtg acatctgcc  
 181 agtactgagg ctggaaagtg ctgggaagca caggaggcag atctctgtg tgacagccac  
 241 tggtagtc attatgtcc ttctctctt gattgtcacc ttctacatcc gcatctggg  
 301 agccatccta gcgatggcc ctacccagag ccggccgcaag gtcttcaca cttgtccctc  
 361 ccatctgctc gtggctctc ttctttgg aacagccagc atcacatca tccggccgca  
 25 421 ggcaggctcc ttgttacca cagaccgcgt cttcgttg ttctacacgg tcatcacacc  
 481 catgt (SEQ ID NO:149).

## OR97

30 LOCUS AF179718 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Papio hamadryas PPA135 pseudogene, partial sequence.  
 ACCESSION AF179718  
 KEYWORDS  
 SOURCE baboon.  
 35 ORGANISM Papio hamadryas  
   Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
   Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
   Papio.  
 REFERENCE 1 (bases 1 to 487)  
 40 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
   Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 45 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
   1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 50 source 1..487  
   /organism="Papio hamadryas"  
   /db\_xref="taxon:9557"  
 gene <1..>487  
   /gene="PPA135"  
 55   /pseudo

BASE COUNT 112 a 140 c 89 g 146 t  
 ORIGIN  
   1 tgtggacatc tgaagtcct tgcaactaccc agtcatcatg aacgaaagaa cacggccaa  
   61 actggctgtc gcttcctgg tcccaggctt tcctgttagct actgtgcaga ccacgtggct  
   5 121 cttcagcttt ccattctgtc gcaccaacaa ggtgaaccac ttcttcgtg acageccacc  
   181 tgtgtcaag ctggctgtc tagacacaggc actgttttagt atctacacca tcactggAAC  
   241 catctgtgtc gtcatgtatcc cttgtttgtc gatctgtgtc tcctacactc tcattgtgc  
   301 tgccatcctc aagatcccat cagctaaagg gaagcataaaa gccttctcta cgtgatcctc  
   361 acatctcctt gtgtcttc ttttctatct atcattaaac ctcacatatt ttccatctaa  
 10 421 atcaaataat ttccttgaaa gcaaaaaagct gctatcattt tcctacactg ttgtgactcc  
   481 catgtg (SEQ ID NO:151).

## OR98

15 LOCUS AF179719 482 bp DNA PRI 31-DEC-2000  
 DEFINITION Papio hamadryas PPA136 pseudogene, partial sequence.  
 ACCESSION AF179719  
 KEYWORDS  
 SOURCE baboon.  
 20 ORGANISM Papio hamadryas  
   Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
   Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
   Papio.  
 REFERENCE 1 (bases 1 to 482)  
 25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
   Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 482)  
 30 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
   1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 35 source 1..482  
   /organism="Papio hamadryas"  
   /db\_xref="taxon:9557"  
   gene <1..>482  
   /gene="PPA136"  
 40 /pseudo  
 BASE COUNT 91 a 151 c 96 g 144 t  
 ORIGIN  
   1 tgtggccatc tgccaccccc tctactatgt cacagecatg agtccctggac tctgttatctt  
   61 gtcctctgc ttgtgtggg ggctctgtc tctctatgtt ctccctctca ctctctctt  
 45 121 gaccagggtt accttctgtc ggactcaaga gatccactac ctctctgtg agatgtatgt  
   181 cttgtcgacatgtt ccaacaccca catcattcac acagtgtgg ttgtactgg  
   241 ctgccttctt ctccgacccc tttagggttca cgtactacatc ctatatacgat attgtcagaa  
   301 ccatacttca gataccctca gcctctaaga aacacaaaac ctctctgcc tttgcctcac  
   361 atttgggtt ggtctccctc ttatggga cacttgtat ggtatactg cagccctcc  
 50 421 acaccaactc catgaaggac tcgtatggca cgtatgtt tgctgtggt acaccaatgt  
   481 tg (SEQ ID NO:152).

## OR99

55 LOCUS AF179720 481 bp DNA PRI 31-DEC-2000

DEFINITION Papio hamadryas olfactory receptor (PPA137) gene, partial cds.  
 ACCESSION AF179720  
 KEYWORDS  
 SOURCE baboon.  
 5 ORGANISM Papio hamadryas  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
     Papio.  
 REFERENCE 1 (bases 1 to 481)  
 10 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 481)  
 15 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 20 source 1..481  
     /organism="Papio hamadryas"  
     /db\_xref="taxon:9557"  
     gene <1..>481  
     /gene="PPA137"  
 25 CDS <1..>481  
     /gene="PPA137"  
     /codon\_start=2  
     /product="olfactory receptor"  
     /translation="LAICQPLRYPVLNMGRLLCTVLVAGAWVAGSIHGSIQATLTFR LP  
 30 YCGPNQVDYFICDIPAVLRLACADTTVNELVTFVDIGVVAASCFMLILLSYANIVHAI  
     LKIRTTDGRRAFSTCGSHLTVTVYYVPCIFIYL RAGSKSPLDGA VAVFYT VVTPFL" (SEQ  
 ID NO:154).  
 BASE COUNT 89 a 139 c 116 g 137 t  
 ORIGIN  
 35 1 cctggcaata tgtcaacccc tgccgtaccc agtgctcatg aatgggaggt tatgcacagt  
     61 ccttgtggct ggagcttggg tcgcggcgc tccatcggt tctatccagg ccaccctgac  
     121 ctccgccta ccctattgtg gccccaaatca ggttagattac ttatctgtg acatccctgc  
     181 agtattgaga ctggccctgtg ctgacacaac tgtcaatgag ctgtgaccc ttgtggacat  
     241 cggagtagtg gccgccagg tccatgtt aattctactt tccatgcca acatagtcca  
 40 301 tgccatctg aagatacgc ccaactgttgg gagggccgg gccttcata cctgtggcgc  
     361 ccacctaact gtgttcacag tctactatgt tccctgtatt ttcatctacc ttagggctgg  
     421 ctccaaagagg cccctggatg gggcagtggc ttttttttttactgtgtca ctccattct  
     481 g (SEQ ID NO:153).

#### 45 OR100

LOCUS AF179721 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Papio hamadryas olfactory receptor (PPA138) gene, partial cds.  
 ACCESSION AF179721  
 50 KEYWORDS  
 SOURCE baboon.  
 ORGANISM Papio hamadryas  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 55 Papio.

REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 5     JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 10     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES     Location/Qualifiers  
     source     1..487  
               /organism="Papio hamadryas"  
               /db\_xref="taxon:9557"  
 15     gene     <1..>487  
               /gene="PPA138"  
     CDS     <1..>487  
               /gene="PPA138"  
               /codon\_start=2  
 20     <product="olfactory receptor"  
               /translation="VAICKPLLYPVIMTNGLCIRLLVLSFVGGLHALIHEGILFRLT  
               FCNSIIHHFYCDIIPLLTISCTDPSINFLMLFILSGSIQVFITLVLSYAFVLFTI  
               LKKKSVKGIRKAFTCGAHLFSVCLYYGPLLFMYVGPASPQADDQDMVECVFYTVIIP  
               FL" (SEQ ID NO:156).  
 25     BASE COUNT     117 a   106 c   74 g   190 t  
 ORIGIN  
     1 tggccata tgcaaacctt tactttatcc agtgattatg accaatggac tggcatccg  
     61 gctatttagtc ttgtcatttg taggtggctt cttcatgcc ttaattcatgc aaggcatttt  
     121 attcagatta accttctgtt attctaacaat aatacatcac ttactgtt acattatccc  
 30     181 attgttaacg attccctgtt ctgacccttc ttaatgtttt ttaatgtttt ttattttgtc  
     241 tggccaata caggttattca ctattttgc tggctgtc ttatgtat ttgccttctt  
     301 tacaatctt aaaaaaaagt cagtc当地agg cataaggaaa gcctttcca cctgtggagc  
     361 ccatctcttc tctgtctgtt tatactatgg ccccccttc ttcatgtatg tggccctgc  
     421 atctccacaa gcagatgatc aagatatggt agagtgtttaatctactg tcatttttttcc  
 35     481 ttctta (SEQ ID NO:155).

## OR101

LOCUS AF179722 487 bp DNA     PRI 31-DEC-2000  
 40 DEFINITION Papio hamadryas olfactory receptor (PPA139) gene, partial cds.  
 ACCESSION AF179722  
 KEYWORDS  
 SOURCE baboon.  
 ORGANISM Papio hamadryas  
 45     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
       Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
       Papio.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 50     TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 55     TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487  
 5 /organism="Papio hamadryas"  
 /db\_xref="taxon:9557"

gene <1..>487  
 10 /gene="PPA139"

CDS <1..>487  
 10 /gene="PPA139"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICNPLLYMVVVSRLCLLVLSTLYLYGFSTAIVVSPCIFSMS  
 YCSSNIINHFYCDIAPLLALSCSDTYLPEAIVFISAATNLVFSMITVLVSYFNIVLSI  
 15 LRMHSSEGRKKAFSTCASHMAVTVFYGTMLFMYLQPQTNHSLTDKMASVFYTLVIP  
 ML" (SEQ ID NO:158).

BASE COUNT 110 a 111 c 85 g 181 t

ORIGIN

20 1 tgtggccatt tgtaaccctc tgctctacat gggtgggtg ttcggccgc ttcgcctcct  
 61 gctggctcc ctacatacc tctatggctt ttctacagctt atttgggtt caccttgat  
 121 attctctatg tttttagtgc ttctataat aatcaatcat ttttactgtt atattgcacc  
 181 tctgttagca ttatctgtc ctgatactta ctaccagaa gcaatagtct tcataatctgc  
 241 agcaacaat ttgggtttt ccatgatttca agttctatgtt ttttttttttca atattgttt  
 301 gtccattcta aggatgcattt catcagaagg aaggaaaaaa gcctttcca cctgtgcctc  
 361 acatatgttgc gcatgtttttt gacaatgtttt ttcatgtttt tgcagcccc  
 421 aaccaaccac tcactggata ctgataagat ggcttcgtt ttttacacat tggtgattcc  
 481 tatgtctg (SEQ ID NO:157).

## OR102

30 LOCUS AF179723 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Papio hamadryas olfactory receptor (PPA140) gene, partial cds.

ACCESSION AF179723

KEYWORDS .

35 SOURCE baboon.

ORGANISM Papio hamadryas

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Papio.

40 REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates

JOURNAL Unpublished

45 REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

50 FEATURES Location/Qualifiers

source 1..487  
 /organism="Papio hamadryas"  
 /db\_xref="taxon:9557"

gene <1..>487  
 55 /gene="PPA140"

CDS <1..>487  
   /gene="PPA140"  
   /codon\_start=2  
   /product="olfactory receptor"  
 5           /translation="VAICFPLHYTAIMSPMLCLALVALSWVLTFHAMLHTLLMARLC  
       FCADNVIPHFFCDMSALLKLACSDTRVNELVIFIMGGLILVIPFLLILGSYARIVSSI  
       LKVPSSKGICKAFSTCGSHLSVVSLFYGTIIGLYFCPSANSSTLKETVMGM MYTVVTP  
       ML" (SEQ ID NO:160).  
 10          BASE COUNT    82 a   141 c   108 g   156 t  
 ORIGIN  
   1 tggccatc tgctcccccc tgeactacac cgccatcatg agccccatgc tctgtctcg  
   6 ctgggtggcg ctgtcctggg tgctgaccac cttccatgcc atgttacaca ctttactcat  
   121 gccagggttg tggtttgcg cagacaatgt gatccccac ttttctgtg atatgtctgc  
   181 tctgtctga ctggccgtc ctgacactcg agtcaatgaa ttggtgatat ttatcatgg  
 15          241 agggctgatt ctgtcatcc cattctact catccctggg tcctatgcac ggattgtctc  
   301 ctccatccctt aagggtccctt cgtctaaggg tatctgcaag ggttctcta ctgtggctc  
   361 ccacctctt gtgggtgtcac tggtctatgg gaccattatt gtgtctact tctgccatc  
   421 agctaatagt tctactctaa aggagactgt tatgggtatg atgtacactg tggtgacccc  
   481 catgctg (SEQ ID NO:159).  
 20

**OR103**

LOCUS AF179724 478 bp DNA PRI 31-DEC-2000  
 DEFINITION Papio hamadryas olfactory receptor (PPA142) gene, partial cds.  
 25          ACCESSION AF179724  
 KEYWORDS  
 SOURCE baboon.  
 ORGANISM Papio hamadryas  
   Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 30          Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
   Papio.  
 REFERENCE 1 (bases 1 to 478)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 35          Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 478)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 40          JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
           1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
   source    1..478  
     /organism="Papio hamadryas"  
 45          /db\_xref="taxon:9557"  
   gene      <1..>478  
     /gene="PPA142"  
   CDS      <1..>478  
     /gene="PPA142"  
     /codon\_start=2  
     /product="olfactory receptor"  
     /translation="VAICKPLNYATIMSQPMCGFLMGVAGILGFVHGGIQLTLFIAQLP  
       FCGPVIDHFMCMDLVLLEACTDTHTLGPLIAANSGSLCFLIFSMLVASYVIILCSL  
       RTHISERHKALSSCTSHIFVVLFFVPCSYLYLRPLTSFPTDKAVTVFCTLFTPML"  
 50  
 55          (SEQ ID NO:162).

BASE COUNT 93 a 126 c 98 g 161 t  
 ORIGIN  
   1 tgtggccatc tgaagccct tgaactatgc aaccatcatg agtcaaccta tgtgtggatt  
   61 cctgatgggg gtggctggga ttctggatt tttgcatttggaa gggatccaga ctctgtcat  
   5   121 agcccagta ccattctgtg gccccatgt catgaccac ttatgtgt atttagtacc  
   181 tcttcctagag ctggcctgca cagacaccta cacccggg cctctgtatcg ctgccaacag  
   241 tggatcattt tgttccatgt gttgggtctt tcattatgtca tcatccttg  
   301 ctccctaagg actcatatctt ctgaagggcg tcacaaagct ctgtctatgtt gtaacctca  
   361 tatcttttgtt gtcatttatctt tttgtccatctgtatctaa gacctctaac  
   10   421 ctccctcccc actgacaaag ctgtactgtt gtttgccacc ctatcacatctatgtt (SEQ ID NO:161).

#### OR104

LOCUS AF179725 487 bp DNA PRI 31-DEC-2000  
 15 DEFINITION Papio hamadryas olfactory receptor (PPA143) gene, partial cds.  
 ACCESSION AF179725  
 KEYWORDS .  
 SOURCE baboon.  
 20 ORGANISM Papio hamadryas  
   Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
   Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
   Papio.  
 REFERENCE 1 (bases 1 to 487)  
 25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
   Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 30 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
   1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
   source 1..487  
   35       /organism="Papio hamadryas"  
      /db\_xref="taxon:9557"  
   gene <1..>487  
      /gene="PPA143"  
   CDS <1..>487  
      40       /gene="PPA143"  
      /codon\_start=2  
      /product="olfactory receptor"  
      /translation="VAICKPLHYLNIMNRRVCTLLVFTSWLVSFLIIFPALMQLD  
      YCRSNIMDHFTCDYFPLLQLACSDTKFLEVGMFSCAVFTLMLTLALIFLSYIYIRTI  
      45       LRIPSASQRTKAFSTCSSHMIVISISYGSCIFMYIKPSAKDRVSLSKGVAILNTSVAP  
      ML" (SEQ ID NO:164).  
 BASE COUNT 120 a 110 c 85 g 172 t  
 ORIGIN  
   1 tgtggccatc tgcattactt gaatatcatg aatcgaagag tctgcacact  
   50   61 gctgtttt acttctggc tgggttcattt cttaaatcata ttcccgacac tcatgttgt  
   121 cttagctttt gattactgtt ggtctaatat tttggccat tttacctgtt atttttcc  
   181 cctgctgcaat cttgtttttt cttttttttt cttttttttt tttttttttt  
   241 tttttttttt tttttttttt tttttttttt tttttttttt tttttttttt tttttttttt  
   301 aaaaatttt tttttttttt tttttttttt tttttttttt tttttttttt tttttttttt  
   361 ccacatgtt gtcatttccat tttttttttt tttttttttt tttttttttt tttttttttt

421 agcaaaagat agagtgcct tgagcaaggg agtggcaata ctaaacacct cagtagcccc  
481 catgctg (SEQ ID NO:163).

## OR105

5

LOCUS AF179726 487 bp DNA PRI 31-DEC-2000  
DEFINITION Papio hamadryas olfactory receptor (PPA144) gene, partial cds.  
ACCESSION AF179726

10 KEYWORDS .

SOURCE baboon.

ORGANISM Papio hamadryas  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Papio.

15 REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

20 REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

25 FEATURES Location/Qualifiers

source 1..487  
/organism="Papio hamadryas"  
/db\_xref="taxon:9557"

gene <1..>487

30 CDS <1..>487  
/gene="PPA144"  
/codon\_start=2

/product="olfactory receptor"

35 /translation="VAICQPLHYSTLLSPWACMAMVGTWSLTGIITATTHAFLIFSLP  
FPSRIIPHFLCDILPVLRLASAGKHRSEISVMTATVVFIMIPFSLIVTSYIRILGAI  
LAMASTQSRRKVFSTCSSHLLVVSLFFGTASITYIRPQAGSSVTTDRVLSLFYTVP  
ML" (SEQ ID NO:166).

40 BASE COUNT 85 a 184 c 95 g 123 t

ORIGIN

1 tggccatc tgccaggcctc tgcaacttc taccctcttg agcccatggg cctgcatggc  
61 catggggc acctctggc tcacaggcat catcacggcc accacccatg cttcctcat

121 ctctctcta cttttccca gcccggccat catcccacac ttctcttg acatccgtcc

181 agtactgagg ctggcaagt ctgggaagca caggagcgag atctctgtga tgacagccac

241 ttagtccttc attatgtatcc cccttcctctt gattgtcacc tcttacatcc gcatctggg

301 agccatctca gcgatggcct ccacccagag cggccgcaag gtcttctcca cttgtctc

361 ccatctgctc gtggctctc tttctttgg aacagccagc atcacctaca tccggccca

421 ggcaggctcc tctgttacca cagaccgcgt cttcgtctc ttctacacgg tcatcacacc

481 catgctc (SEQ ID NO:165).

50

## OR106

55

LOCUS AF179727 487 bp DNA PRI 31-DEC-2000

DEFINITION Pan troglodytes olfactory receptor (PTR183) gene, partial cds.

ACCESSION AF179727

**KEYWORDS** .  
**SOURCE** chimpanzee.  
**ORGANISM** Pan troglodytes  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 5 Eutheria; Primates; Catarrhini; Hominidae; Pan.  
**REFERENCE** 1 (bases 1 to 487)  
**AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
**TITLE** The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 10 **JOURNAL** Unpublished  
**REFERENCE** 2 (bases 1 to 487)  
**AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
**TITLE** Direct Submission  
**JOURNAL** Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 15 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
**FEATURES** Location/Qualifiers  
 source 1..487  
 /organism="Pan troglodytes"  
 /db\_xref="taxon:9598"  
 20 gene <1..>487  
 /gene="PTR183"  
 CDS <1..>487  
 /gene="PTR183"  
 /codon\_start=2  
 25 /product="olfactory receptor"  
 /translation="VAICFPLHYTAIMSPMLCLSVVLSWVLTTFHAMLHTLLMARLC  
 FCADNVIPHFFCDMSALLKLACSDTRVNEWVIFIMGLIVVIPFLILGSYARIVSSI  
 LKVPSKGICKALSTCGSHLSVVSLFYGTIVIGLYLCPANSSTLKDTVMAMMYTVVTP  
 30 ML" (SEQ ID NO:168).  
**BASE COUNT** 86 a 137 c 105 g 159 t  
**ORIGIN**  
 1 tgtggccatc tgttcccccc tgcaaacac cgccatcatg agccccatgc tctgtctc  
 61 cgtggtgacg ctgtcctggg tgctgaccac ctccatgcc atgttacaca cttaactcat  
 35 121 ggccagggttg tgtttttgtg cagacaatgt gatccccac ttttctgtg atatgtctgc  
 181 tctactgaag ctggcctgtct ctgacactcg agttaatgaa tgggtgtat tatcatggg  
 241 agggcttatt gtgtcatcc cattctact catccctggg tcctatgcaa gaattgtctc  
 301 ctccatcctc aagggtccctt ctcttaaggg tatctgcaag gccttgctta ctgtggctc  
 361 ccacctgtct gtgggtgtcac tgttctatgg gaccgttatt ggctctact tatcccatc  
 40 421 agctaatagt tctactctaa aggacactgt catggctatg atgtacactg tggtgacccc  
 481 catgctg (SEQ ID NO:167).

## OR107

45 **LOCUS** AF179728 487 bp DNA **PRI** 31-DEC-2000  
**DEFINITION** Pan troglodytes olfactory receptor (PTR203) gene, partial cds.  
**ACCESSION** AF179728  
**KEYWORDS** .  
**SOURCE** chimpanzee.  
 50 **ORGANISM** Pan troglodytes  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pan.  
**REFERENCE** 1 (bases 1 to 487)  
**AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
 55 **TITLE** The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 5 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 10 source 1..487  
     /organism="Pan troglodytes"  
     /db\_xref="taxon:9598"  
 gene <1..>487  
     /gene="PTR203"  
 CDS <1..>487  
 15      /gene="PTR203"  
     /codon\_start=2  
     /product="olfactory receptor"  
     /translation="VAICFPLHYTAIMSPMLCLSVVALSWVLTFHAMLHTLLMARLC  
     FCADNVIPHFCDMSALLKLACSDTRVNEWVIFIMGGLIVVIPFLILGSYARIVSSI  
 20  
 LKVPSKGICKALSTCGSHLSVVSFYGTIVGLYLCPANSSTLKDVTMAMMYTVVTP  
     ML" (SEQ ID NO:170).  
 BASE COUNT 85 a 137 c 106 g 159 t  
 ORIGIN  
 25 1 tgtggccatc tgttcccccc tgcactacac cgccatcatg agccccatgc tctgtctc  
     61 ctgtggccatc ctgtctggg tgctgaccac ctccatgcc atgttacaca ctttactcat  
     121 ggccagggttg tgtttttgtg cagacaatgt gatccccac ttttctgtg atatgtctgc  
     181 tctactgaag ctggctgtctgtg acgttaatgaa tgggtgatat ttatcatggg  
     241 agggcttattt gtgtcatcc cattctact catccctggg tcctatgeaa gaattgtctc  
     301 ctccatccctt aagggtccctt ctgtctaaagggtt tctgtcaaggg gcctgtctt ctgtggctc  
     361 ccacctgtctgtc acgtttatgg gaccgttattt ggtctctact tatggccatc  
     421 agctaatagtt tctactctaa aggacactgtt catggctatg atgtacactg tggtgacccc  
     481 catgctg (SEQ ID NO:169).

### 35 OR108

LOCUS AF179729 485 bp DNA PRI 31-DEC-2000  
 DEFINITION Pan troglodytes PTR204 pseudogene, partial sequence.  
 40 ACCESSION AF179729  
 KEYWORDS  
 SOURCE chimpanzee.  
 ORGANISM Pan troglodytes  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 REFERENCE 1 (bases 1 to 485)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 45 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 50 REFERENCE 2 (bases 1 to 485)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers

OR109

20 LOCUS AF179730 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Pan troglodytes olfactory receptor (PTR205) gene, partial cds.  
 ACCESSION AF179730  
 KEYWORDS  
 25 SOURCE chimpanzee.  
 ORGANISM Pan troglodytes  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 REFERENCE 1 (bases 1 to 487)  
 30 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 35 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 40 source 1..487  
     /organism="Pan troglodytes"  
     /db\_xref="taxon:9598"  
 gene <1..>487  
     /gene="PTR205"  
 45 CDS <1..>487  
     /gene="PTR205"  
     /codon\_start=2  
     /product="olfactory receptor"  
     /translation="VAICRPLCYSTVTRPQVCALMLALCWVLTNIIALTHTFLMARLS  
         FCVTGEIAHFFCDITPVKLSCSDTHINEMMVFVLGGTVLIVPFLCIVTSYIHVPAI  
         LRVRTRGGVGKAFSTCSSHLCVVCFYGTLFSAYLCPPSIASEEKDIAAAAMYTIVTP  
         ML" (SEQ ID NO:173).  
 50 BASE COUNT 83 a 148 c 110 g 146 t  
 ORIGIN  
 55 1 tgtggccatt tgccgcccccc tctgtactc cacagtcacg aggccccaaag tctgtgccct

61 aatgcttgc ttgtgtgg tcctcaccaa tatcattgcc ctgactcaca cgttcctcat  
121 ggctcggtg tccttcgtg tgactggga aatgtcctac ttttctgtg acatcactcc  
181 tgcctgaag ctgtcatgt ctgacaccca catcaacgag atgtatggtt ttgtcttggg  
241 aggcacccgtt ctcatcgcc cctttttatg ctttgtcacc tcctacatcc acatttgcc  
301 agctatctgt agggtccgaa cccgtgtggg ggtgggcaag gccttttcca cctgcagtcc  
361 ccacctctgc ttgtttgtg tttctatgg gacgccttc agtgcctacc ttgtgtccccc  
421 ctccattgcc tctgaagaga aggacatgc agcagctca atgtacacca tagtgactcc  
481 catgttgc (SEQ ID NO:172).

10 OR110

LOCUS AF179731 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Pan troglodytes olfactory receptor (PTR206) gene, partial cds.  
 ACCESSION AF179731  
 KEYWORDS .  
 SOURCE chimpanzee.  
 ORGANISM Pan troglodytes  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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         /db\_xref="taxon:9598"  
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         /gene="PTR206"  
     CDS <1..>487  
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         /codon\_start=2  
         /product="olfactory receptor"  
         /translation="VAICHPLHYSTIMALRLCASLVAAPWVIAILNPLLHTLMMALH  
             FCSDNVIHHFFCDINSLLPLSCSNTSLNQLSVLATVGLIFVVPSVCILVSYIILIVSAV"

MKVPSAQGKLKAFSICGSHLALVLFYGAITGVYMSPLSNHSTEKDSAASVIFMVVAPP  
VL" (SEQ ID NO:175).

45            BASE COUNT    90 a    138 c    91 g    168 t  
              ORIGIN

1 cgtggccatc tgcaccctt tacattactc caccattatg gccctgcgcc tctgtggcc  
61 tctggtagct gcacccgtgg tcattgcat tttaaccct ctcttcgcaca ctctttatgat  
121 ggcccatctg cacttctgtct ctgataatgt tatccaccat ttcttcgttg atatcaactc  
181 tctctccct ctgtctgtt ccaacaccag tcttaatcag ttgagtgttc tggctacgg  
241 gggctgtatc ttgtgttgtac cttcagttgt tatccctggta tccttatatcc tcattgtttc  
301 tgctgtatgt aaagtccctt ctgccccagg aaaactcaag gctttctata tctgtggatc  
361 tcacccttgcc ttggtcattt ttcttatgg agcaatcaca ggggtctata tgagccccc  
421 atccaatcac tctactgaaa aagactcagc cgccatcagtc atttttatgg ttgttagcacc  
481 tgtgttg (SEQ ID NO:174).

## OR111

5 LOCUS AF179732 487 bp DNA PRI 31-DEC-2000  
DEFINITION Pan troglodytes olfactory receptor (PTR207) gene, partial cds.  
ACCESSION AF179732  
KEYWORDS  
SOURCE chimpanzee.  
ORGANISM Pan troglodytes  
10 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
15 Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
20 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
25 source 1..487  
/organism="Pan troglodytes"  
/db\_xref="taxon:9598"  
gene <1..>487  
/gene="PTR207"  
CDS <1..>487  
/gene="PTR207"  
30 /codon\_start=2  
/product="olfactory receptor"  
/translation="VAVCNPLLYTVAMYQRLCSLLVATSYCWGRVCSLTLYFLLELS  
FRGNNIINNFVCEHAAIVAVSCSDPYVSQEITLVSATFNEISSLVITLTSYAFIFITV  
MKTASIGGRKKAFFTCASHLTAITIFHTILFLYCVPSKSSWLMVKVASVFYTVVIP  
35 ML" (SEQ ID NO:177).  
BASE COUNT 99 a 122 c 103 g 163 t  
ORIGIN  
40 1 tgtggcggtg tctaaccctc ttctctacac agttcaatg taccagaggc ttgcgtccctt  
61 gtgtggcgct acatcatact gtgtggggag agtctgtcc ctgacactta cctactttct  
121 actgaaatta tccttcagag gaaataatat cattaataac ttgtctgtg agcatgctgc  
181 cattgtgtc gtgtctgtc ctgaccccta tggagccag gagatcactt tagttctgc  
241 cacattcaat gaaataagca gcctgggtat cactctactt tcattatcat  
301 cactgtcatg aagacggctt ccattgggg ggcgaagaaa gcgttctca cgttgtgcctc  
361 ccacattgacg gccattacca ttccatgg gactattttt ttctctactt gtgtcccaa  
421 ctccaaaagt tcgtggctca tggcaagggt ggcctctgic ttttacacag tggtcattcc  
481 catgctg (SEQ ID NO:176).

## OR112

50 LOCUS AF179733 481 bp DNA PRI 31-DEC-2000  
DEFINITION Pan troglodytes olfactory receptor (PTR208) gene, partial cds.  
ACCESSION AF179733  
KEYWORDS  
SOURCE chimpanzee.  
ORGANISM Pan troglodytes

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 REFERENCE 1 (bases 1 to 481)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 5 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 481)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 10 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source     1..481  
 15           /organism="Pan troglodytes"  
       /db\_xref="taxon:9598"  
 gene      <1..>481  
       /gene="PTR208"  
 CDS       <1..>481  
 20           /gene="PTR208"  
       /codon\_start=2  
       /product="olfactory receptor"  
       /translation="LAICQPLRYPVLMNGRLCTVLVAGACVAGSMHGSIQATLTFR LP"

25 YCGPNQVDYFICDIPAVLRLACADTTVNELVTFVDVGVVAASCFMLILLSYANIVNAI  
 LKIRTTDGRHRAFSTCGSHLIVVTVYYVPCIFIYLRAGSKGPLDGAAAVFYTVVTPLL" (SEQ ID NO:179).  
 BASE COUNT 85 a 141 c 124 g 131 t  
 ORIGIN  
 30 1 ctggcaata tgcagcccc tgcgtaccc agtgcataig aatgggagggt tatgcacagt  
   61 ctttgtggct ggagcttg tcgcggcgtc catgcatttgc tctatccagg ccacccgtac  
   121 ctccggctcg ccctactgtt ggcccaatca ggtggattac ttatctgtt acatccccgc  
   181 agtattgaga ctggccgttg ctgacacaac tgtcaatggat cttgtgaccc ttgtggacgt  
   241 cgggtgggt gcccggcgtt gcttcatgtt aattctgtc tcgtatgcca acatagtaaa  
 35 301 tgccatcttg aagatacgca ccactgtatgg gggcaccgg gccttctcca cctgtggcgc  
   361 ccacctaatac gggcacatgt tctactatgtt cccctgtatt ttcatctacc ttagggctgg  
   421 ctccaaaggc cccctggatgg gggcggcggc tgggtttac actgttgca ctccattact  
   481 g (SEQ ID NO:178).

40 OR113

LOCUS AF179734 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Pan troglodytes olfactory receptor (PTR209) gene, partial cds.  
 ACCESSION AF179734  
 45 KEYWORDS  
 SOURCE chimpanzee.  
 ORGANISM Pan troglodytes  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 50 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 5     FEATURES       Location/Qualifiers  
       source       1..487  
           /organism="Pan troglodytes"  
           /db\_xref="taxon:9598"  
       gene        <1..>487  
 10      /gene="PTR209"  
       CDS        <1..>487  
           /gene="PTR209"  
           /codon\_start=2  
           /product="olfactory receptor"  
 15      /translation="VAICHPLYYRVIVNPRLCGLLVLVSWFLSLYSIQSLLMLQVS  
           FCTSWVIQHFYCELAQVLTLCSDTHVNYILLYVVTGLLDFVPFGILFSYTQIVSYI  
  
 LRIISSTDGKHAKSTCGSHLFVVSLFYGTGLGVYLSSNASSSSWWGMVASVMYTVVTP  
     ML" (SEQ ID NO:181).  
 20     BASE COUNT   79 a   144 c   107 g   157 t  
 ORIGIN  
     1 cgtggccatc tgtcaccccc tgcataccg tgcatacgta aaccccccgc tctgtggcct  
     61 gtcggttctt gtgccttgtt tcctcagttt gtcatactcc ctgcattccaga gtctgttgat  
     121 gctgcagggtg tccttcgttta ccagttgggtt cattcagcac ttactgttgc agcttgtca  
 25      181 ggtcctcacg cttaccgttgc cagacacaca cgtcaattt acatctgttgc acgtgggtac  
     241 tgcccttcgttgc acttttttttgc ctttcaggat gatcttttttcc tccatcaccc aaatgttgc  
     301 ctacatccta agaatctcat ccacagatgg gaaacacaaa gccttttcta cctgtggatc  
     361 tcatactgtttt gtcgttttttattttatgg gacaggccctt ggtgtgtatc ttatgttccaa  
     421 tgcatcgcc tccttcgttgc gggccatgtt ggccctcggtc atgtacactg tggccaccccc  
 30      481 catgcgtt (SEQ ID NO:180).

## OR114

LOCUS AF179735 487 bp DNA       PRI 31-DEC-2000  
 35     DEFINITION Pan troglodytes olfactory receptor (PTR210) gene, partial cds.  
 ACCESSION AF179735  
 KEYWORDS  
 SOURCE chimpanzee.  
 ORGANISM Pan troglodytes  
 40      Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
         Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 45      Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 50     JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES       Location/Qualifiers  
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           /organism="Pan troglodytes"  
 55      /db\_xref="taxon:9598"

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 CDS <1..>487  
   /gene="PTR210"  
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   /product="olfactory receptor"  
   /translation="VAICNPLLYPVMMSNKLSAQQLSISYVIGFLHPLVHVSSLRLT  
     FCRFNIIHYFYCEILQLFKISNGPSINALMIFIFGAFIQIPTLMTIIISYSRVLFDI  
     LKKKSEKGRSKAFSTCSAHLVSLLYYGTLIFMYVRPASGLAEDPDKVYSLFYIIIP  
     LL" (SEQ ID NO:183).  
 10  
 BASE COUNT 129 a 107 c 78 g 173 t  
 ORIGIN  
   1 ttagccata tgtaatccct tgctttatcc agtgatgatg tccaacaaac tcagcgctca  
   61 ttgtcataagg attcatatg taattggttt cctgcacatc ctggttcatg tgagttact  
 15  
   121 attcgcacta actttctgcga gggttaacat aatacattt ttctactgtg aaattttaca  
   181 actgttcaaa atttcatgcga atggccatc tattaacgca ctaatgatat ttattttgg  
   241 tgctttata caaaatcccc ctttaatgac gatcataate tcttttctc gtgtgtctt  
   301 tgatattctg aaaaaaaaagt ctgaaaaggg cagaagcaaa gccttc当地 catgcagcgc  
   361 ccatctgcctt tctgtctcat tgtaatcggg aactctgatc ttcatgtatg tgcgtcctgc  
 20  
   421 atctggctta gctgaagacc cagacaaagt gtattctctg ttttacacga ttataattcc  
   481 cctgcta (SEQ ID NO:182).

### OR115

25 LOCUS AF179736 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Pan troglodytes olfactory receptor (PTR211) gene, partial cds.  
 ACCESSION AF179736  
 KEYWORDS  
 SOURCE chimpanzee.  
 30 ORGANISM Pan troglodytes  
   Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
   Eutheria; Primates; Catarrhini; Hominidae; Pan.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 35 TITLE The olfactory receptor gene repertoire in primates and mouse:  
   Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 40 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
   1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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 45       /organism="Pan troglodytes"  
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     /gene="PTR211"  
   CDS <1..>487  
     /gene="PTR211"  
     /codon\_start=2  
     /product="olfactory receptor"  
     /translation="VAICHPLRYTVLMNIHFCGLLILLSRFMSTM DALVQSLMIFQLS  
       FCKNVEIPLFFCEVVQVIKLACSDTLINNILIYFASSIFGAIPSGIIFSYSQIVTSV

LRMPSARGKYKAFSTCGCHLSVFSLFYGTAFGVISSAVAESSRITAVGSVMYTVPQ  
MM" (SEQ ID NO:185).

5 BASE COUNT 102 a 120 c 98 g 167 t

ORIGIN

1 tgtggcatt tgccacccac tgaggtacac agtcctcatg aacatccatt tctgcggctt  
61 gctgattctt ctctccagggt tcatacgacat taggatgcc ctgggtcaga gtctgtat  
121 atttcagctg ttcttcgtca aaaacgttga aatcccttg ttcttcgtg aagtcttca  
181 ggtcataag ctgcctgtt ctgcacaccat catcaacaac atcctcatat attttgcag  
241 tagcatattt ggtgcatttc ctctctgtt aataatttt tcttttctc aaatgtcac  
301 ctctgtctg agaatgcatt cagaagagg aaagtataaa gctgtttcca ctgtggctg  
361 tcacctctt gttttttctt tgtttatgg gacagttt ggggttcca tttagttctgc  
421 ttttgttgcgtt gttttccgaa ttactgcgtt ggggttgcgtt atgtacatg tggccccaca  
481 aatgtatg (SEQ ID NO:184).

15

## OR116

LOCUS AF179737 487 bp DNA PRI 31-DEC-2000

DEFINITION Pan troglodytes olfactory receptor (PTR212) gene, partial cds.

20

ACCESSION AF179737

KEYWORDS .

SOURCE chimpanzee.

ORGANISM Pan troglodytes

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pan.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

30

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

35

FEATURES Location/Qualifiers

source 1..487  
/organism="Pan troglodytes"  
/db\_xref="taxon:9598"  
40 gene <1..>487  
/gene="PTR212"  
CDS <1..>487  
/gene="PTR212"  
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/product="olfactory receptor"  
/translation="VAICHPLHYTIVMREELCVFLVAWSWILSCASSLSHTLLLRLS  
FCAANTIPHVFCDLAALLKLSCSDIFLNELVMFVGVVVITLPFMCLVSYGYIGATI  
LRVPSTKGHAKALSTCGSHLSVSVLYGSIFGQYLFPVVSSIDKDVALMYTVVTP  
ML" (SEQ ID NO:187).

50

BASE COUNT 87 a 141 c 105 g 154 t

ORIGIN

1 tgtggccata tgccacccctc tccactacac tgtcatcatg agggaaagacg tctgtgtt  
61 cttagtggct gtatcttggta ttctgtcttgc tggcagatcc ctcttcacat cccttctt  
121 gacccggctg ttcttcgttgc ctgcgaacac catccccat gtcttcgtg accttgc  
181 cctgctcaag ctgtcctgtt cagatatctt cctcaatgatg ctggcatgt tcacagtagg

241 ggtggggc attaccctgc cattcatgtg tatccatggta tcatatggct acattgggc  
301 caccatctcg agggccctt caaccaaagg gatccacaaa gcattgtcca catgtggctc  
361 ccatctctcg ttgtgtctc tcattatgg tcataatattt ggccagtacc ttcccac  
421 tgtaagcgt tctattgaca aggatgtcat tggtgtctc atgtacacgg tggtcacacc  
5 481 catgtt (SEQ ID NO:186).

## OR117

LOCUS AF179738 484 bp DNA PRI 31-DEC-2000  
10 DEFINITION Hylobates lar HLA121 pseudogene, partial sequence.  
ACCESSION AF179738  
KEYWORDS .  
SOURCE common gibbon.  
ORGANISM Hylobates lar  
15 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
REFERENCE 1 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
20 Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
25 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
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/db\_xref="taxon:9580"  
gene <1..>484  
/gene="HLA121"  
/pseudo  
BASE COUNT 88 a 145 c 118 g 133 t  
35 ORIGIN  
1 tgggtatc tgccgtccgc ttaggttatcc agagctcatg agtggcaga cctgcgtca  
61 gatggcagca ctgagctggg ggacaggct tgccaaactca ctgctacagt ccattttgt  
121 ctggcgcctc cttttctgtg gccacaacgt catcaaccac ttttctgtg agatcttgc  
181 agtgcataaa ctggccgttg gggacatctc cctcaatgg ctggcattaa tggggccac  
40 241 agctgtccctg acactggccc ccctctgtc catctgttg tcttacctt tcatcttgc  
301 tgccatccctt agggtacctt ctgtgcagg cggggcaaa gccttcaca cttgttcagc  
361 ccacccaca gtgggttgtt ttttttaagg gacaatttcc ttcatgtact tcaaaacccaa  
421 ggcacaggac cccaacgtgg ataagattgt tgcaattgtt tatgggttg tgacaccctc  
481 gctg (SEQ ID NO:188).  
45

## OR118

LOCUS AF179739 487 bp DNA PRI 31-DEC-2000  
50 DEFINITION Hylobates lar olfactory receptor (HLA122) gene, partial cds.  
ACCESSION AF179739  
KEYWORDS .  
SOURCE common gibbon.  
ORGANISM Hylobates lar  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
55 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.

REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 5     JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 10    JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
       1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES    Location/Qualifiers  
     source    1..487  
               /organism="Hylobates lar"  
               /db\_xref="taxon:9580"  
 15     gene    <1..>487  
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 CDS     <1..>487  
               /gene="HLA122"  
               /codon\_start=2  
 20     /pattern="olfactory receptor"  
               /translation="VAVCNPLLYTVAMSQRQLCSLLVATSYSWGVCFLTLYFLLELS  
               FRGNNIINNFVCHEAAIAVSCSDPYVSQEITLVSATFNEISSLMMIFTSYAFIFITV  
               MKMPSTGGRKKAFSTCASHLTAITIFHGTLFPYCVPNSSWLMVKVTSVFYTFIP  
               MV" (SEQ ID NO:190).  
 25    BASE COUNT   101 a   124 c   97 g   165 t  
 ORIGIN  
     1 tgccgggtg tggtaaccctc ttctctacac agtgcatacg tcccaaggcc ttgttcctt  
     6 gtgggtggct acatcataact ctgggggat agtctgttc ctgacactta cctactttct  
 121 actggaaatta tccttcagag gaaataaatat cattaataaac ttgtctgtg agcatgtgc  
 181 catttgttgct gtgtcttgct ctggccctca tggtagccag gagatcaact tagtttctgc  
 241 cacattcaat gaaataagca gtctgtatgat gatttcaact tcctatgctt tcattttat  
 301 cactgtcatg aagatgcctt ccactggggg ggcgaagaaa gcgttcctcca cgtgtgcctc  
 361 ccacccgtacc gccattacca ttccatgg gactatccctt tcctactt gtgtctaa  
 421 ctccaaagt tcatggctca tggtaaggt gacctctgct tttcacacag tggcattcc  
 481 catggtg (SEQ ID NO:189).

### OR119

LOCUS AF179740 486 bp DNA    PRI 31-DEC-2000  
 40    DEFINITION Hylobates lar olfactory receptor (HLA123) gene, partial cds.  
 ACCESSION AF179740  
 KEYWORDS  
 SOURCE common gibbon.  
 ORGANISM Hylobates lar  
 45    Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
       Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
 REFERENCE 1 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 50    JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 55    JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

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5 /organism="Hylobates lar"  
/db\_xref="taxon:9580"  
gene <1..>486  
/gene="HLA123"  
CDS <1..>486  
10 /gene="HLA123"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICHPLHYATIMSQSQCVMLVAGSWVIACACALLHTLLAQLS  
FCADHIIIPFFCDLGALLKLSCTSLSNQLAIFTAGLTAIMLPFLCILVSYGHIGVTI  
LQIPSTKGICKALSTCGSHLSVVTIYYGTIIGLYFLPPSSNTNDKNIIASVIYTVVTP  
15 M" (SEQ ID NO:192).  
BASE COUNT 95 a 144 c 93 g 154 t  
ORIGIN  
1 tggccatc tgacccctc tacattatgc caccatcatg agtcagagcc agtgtgtcat  
61 gctggcggtt gggcctggg tcatacgctg tgcgtgtgt ctttgcata ccctccctct  
20 121 ggcccagtt tcctttgtt ctgaccacat catccctcac ttcttctgtt accttgggtc  
181 cctgctcaag ttgcgtgtt cagataccctc ctcataatcg ttggcaatct ttacagcagg  
241 attgacagcc attatgcctc cattttgtt catccgtttt ttttatggtc acatttgggt  
301 caccatccctc cagattccctc ttaccaaggg catatgcaa gcctgtcca ctgtggatc  
361 ccacccctca ggggtacta ttattatgg gacaattatt ggtctctatt ttctcccc  
421 atccagcaac accaatgaca agaacataat tgcttcgtt atatacacag tagtcactcc  
481 catgtt (SEQ ID NO:191).

**OR120**

30 LOCUS AF179741 487 bp DNA PRI 31-DEC-2000  
DEFINITION Hylobates lar olfactory receptor (HLA124) gene, partial cds.  
ACCESSION AF179741  
KEYWORDS .  
35 SOURCE common gibbon.  
ORGANISM Hylobates lar  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
40 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
45 TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
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50 /organism="Hylobates lar"  
/db\_xref="taxon:9580"  
gene <1..>487  
/gene="HLA124"  
CDS <1..>487  
55 /gene="HLA124"

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/codon_start=2
/product="olfactory receptor"
/translation="VAICSP LHYPVIMNQR TRAKLAAASWFP GFPVATVQTTWLFSFP
FCGT NKVNHFFCDSPPV LRLVCADTALFEIYAI VGTILVV MIPCLL ICSYTHIAAAI
LKIPSAKGNKA FSTCSSHLLV VSLFYISLSLT YFRPKSNN SPEGKKLLSLSYTVVTP
ML" (SEQ ID NO:194).

COUNT    102 a   141 c   96 g   148 t
N
tgtggccatc tgttagtcctc tgcactaccc agtcatcatg aaccaaaagga ctcgtgccaa
actggctgct gcctccctgg tccaggctt tcctgtatgc actgtgcaga ccacatggct
| ctccatgtttt ccattctgtg geaccaaca a gttaaaccac ttcttctgtg acagcccccc
tgtgtgtgagg ctggctctgtg cagacacacgc actgtttgag atctacgcca tcgtcgaa
| cattctgtgtg gtcatgtatcc ctgtgtgt gatctgttgc tcctatactc acatggctgc
tgccatccctc aagatcccat cggctaaagg gaagaataaa gccttctcta cgtgttcctc
| acacccctt gtgtctctc tttttatatc atcattaagc ctcacatatt ttccggctaa
atcaaaaatat ttccttgagg gcaagaagct gcttatcttgc tcctacactg ttgtgactcc
catgtt (SEQ ID NO:193).

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OR121

20 LOCUS AF179742 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Hylobates lar olfactory receptor (HLA125) gene, partial cds.  
 ACCESSION AF179742  
 KEYWORDS  
 25 SOURCE common gibbon.  
 ORGANISM Hylobates lar  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
 REFERENCE 1 (bases 1 to 487)  
 30 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 35 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 40 source 1..487  
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     /gene="HLA125"  
 45 CDS <1..>487  
     /gene="HLA125"  
     /codon\_start=2  
     /product="olfactory receptor"  
     /translation="VAICKPLHYLNIMNRRVCILLVFTSWLISFLIIFPALMLLKLD  
     YCRSNIIDHFTCDYFPLLQLACSDTKFLEVMAFSCAVFTLMFTLALISLSYIYIIRTI  
     LRIPSTSQRTEKAFSTCSSHMVVVISISYGSCIFMYIKPSAKDRVSLSKGVAILNTSVAP  
     MM" (SEQ ID NO:196).  
 50 BASE COUNT 121 a 107 c 82 g 177 t  
 ORIGIN  
 55 1 tggtggccatc tgcaaggctc tgcattacatt gaatatcatg aatcgaagag tctgcatact

61 gcttgtttt acttcttggc tgatttcatt cttaaatcata ttccctgcac tcatgttgt  
121 cttaaagctt gattactgtt ggtctaatat tattgaccat ttacctgtt attatttcc  
181 cctgctgca cttgctgtt cagacacaaa attcttagag gtgtatggcat ttcttggtc  
241 tgtgtttact ctaatgttca ctttggcatt aatatctgt tcctcacat acattatcg  
301 aacaattttt agaatttcctt ctactgtca gaggacaaaag gcctttcca catgttcttc  
361 ccacatggtt gtatattcca tccttatgg cagctgcatt ttatgtaca ttaaacccctc  
421 agcaaaagat agagtgttct tgagcaaggg agtggcaata ctaaacacctt ctagcccc  
481 catgatg (SEQ ID NO:195).

10 **OR122**

LOCUS AF179743 484 bp DNA PRI 31-DEC-2000  
DEFINITION Hylobates lar olfactory receptor (HLA126) gene, partial cds.  
ACCESSION AF179743  
KEYWORDS .  
SOURCE common gibbon.  
ORGANISM Hylobates lar  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
REFERENCE 1 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..484  
/organism="Hylobates lar"  
/db\_xref="taxon:9580"  
gene <1..>484  
/gene="HLA126"  
CDS <1..>484  
/gene="HLA126"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICHPLHYTVIMREELCVFLVAISWILSCASSLSHTLLTRLS  
FCAANTIPHVFCDLAALLKLSCSDFLNELVMTVGVVVITLPFMCLVSYGYIGATI  
LRVPSTKGHIHKASTCGSHLSVSVLYGSIFGQYLFPTASSSIDKDVIDVAVMYTVITPM  
L" (SEQ ID NO:198).  
40  
45 BASE COUNT 88 a 143 c 104 g 149 t  
ORIGIN  
1 tggccata tgcaccctc tccactacac tgcgtatcatg agggagagc tctgtgtt  
61 cttagtgctt atatcttggc ttctgtctgt tgccagctcc ctcttcaca cccttctt  
121 gacccggctg tcttctgtt ctgcgaacac catccccccac gtcgtctgtt accttgtct  
181 cctgctcaag ctgtctgtt cagatatctt cttcaatggat ctggctatgt tcacagttag  
241 gggtgggtt attaccctgc cttccatgtt tatctggta tcatatggctt acatgggg  
301 caccatctgtt agggccctt caaccaaagg gatccacaaaag cggtccacgt gtggctccca  
361 tctttctgtt gtgtctctt attatgggtt aatattggc cagtaccctt tcccgaccgc  
421 aageagttcc attgacaagg atgtcattgtt ggctgtcatg tacacagtga tcacacccat  
481 gttt (SEQ ID NO:197).  
50  
55

## OR123

LOCUS AF179744 487 bp DNA PRI 31-DEC-2000  
5 DEFINITION Hylobates lar olfactory receptor (HLA127) gene, partial cds.  
ACCESSION AF179744  
KEYWORDS  
SOURCE common gibbon.  
ORGANISM Hylobates lar  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
10 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
15 JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
20 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..487  
/organism="Hylobates lar"  
/db\_xref="taxon:9580"  
25 gene <1..>487  
/gene="HLA127"  
CDS <1..>487  
/gene="HLA127"  
/codon\_start=2  
30 /product="olfactory receptor"  
/translation="VAICHPLHYATIMSQSQCVMLVAGSWVIACACALLHTLLAQLS  
FCADHIIIPHFFCSDLGALLKLSCSDTSNQLAIFTAGLTAIMPLFLCILVSYGHIGVTI  
LQIPSTKGICKALSICGS HLSVVTIYYGTIIGLYFLPPSSNTNDKNIIASVIYTVVTP  
ML" (SEQ ID NO:200).  
35 BASE COUNT 95 a 143 c 94 g 155 t  
ORIGIN  
1 tgtggccatc tgtcacccctc tacattatgc caccatcatg agtcagagcc agtgtgtcat  
61 gctgggtggct gggcctggg tcacgcctg tgcgtgtgt ctttgcata ccctccctcc  
121 ggcccaagtt tccttttggt ctgaccacat catccctcac ttcttctgtg accttgggtc  
181 cctgcctaag ttgcctgtc cagataacctc ctcataatcg ttggcaatct ttacagcagg  
241 attgacagcc attatgttc cattctgtg catcctgggt ttatgtgtc acatgggg  
301 caccatcctc cagattccctt ctaccaaggg cataatgc aa gccttgcca ttgtggatc  
361 ccacctctca tggttgacta tctattatgg gacaattatt ggctctatt ttctcccc  
421 atccageaac accaatgaca agaacataat tgcttcagt atatacacag tagtcactcc  
481 catgttg (SEQ ID NO:199).

## OR124

LOCUS AF179745 484 bp DNA PRI 31-DEC-2000  
50 DEFINITION Hylobates lar olfactory receptor (HLA128) gene, partial cds.  
ACCESSION AF179745  
KEYWORDS  
SOURCE common gibbon.  
ORGANISM Hylobates lar  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hylobatidae; *Hylobates*.  
 REFERENCE 1 (bases 1 to 484)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 5 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 484)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 10 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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     /organism="Hylobates lar"  
 15 /db\_xref="taxon:9580"  
 gene <1..>484  
     /gene="HLA128"  
 CDS <1..>484  
     /gene="HLA128"  
 20 /codon\_start=2  
     /product="olfactory receptor"  
     /translation="VAICHPLHYTVIMREELCVFLVAWSWILSCASSLSHTLLLRLS  
     FCAANTIPHVFCDLAALLKLSCSDIFLNELVMTVGVVVITLPFMCLVSYGYIGATI  
     LRVPSTKGHIHKASTCGSHLSVSVLYGSIFGQYLFPTASSSIDKDVIVAVMYTVITPM  
 25 L" (SEQ ID NO:202).  
 BASE COUNT 87 a 143 c 105 g 149 t  
 ORIGIN  
     1 tgttgcata tgtcacccctc tccactacac tgtcatcatg agggaaagagc tcttgtctt  
     61 cttagtggtct gtatcttgga ttctgtcttg tgccagctcc ctctctcaca ccctttctct  
 30 121 gaccggctg tccttcgtg ctgcgaacac catccccccac gtcttcgtg accttgtcg  
     181 cctgcctaag ctgtcctgtc cagatatctt cctcaatggat ctggtcatgt tcacagttagg  
     241 ggftgggtgtc attaccctgc cattcatgt tacctctgtt tcatatggct acattgggc  
     301 caccatctg agggtccctt caaccaaagg gatccacaaa gctgtccacgt gtggctccca  
     361 tcatttcgtg gtgtctctt attatggtc aatattggc cagttacctt tcccgaccgc  
 35 421 aagcagttcc atgacaagg atgtcattgt ggctgtcatg tacacagtga tcacacccat  
     481 gtgt (SEQ ID NO:201).

## OR125

40 LOCUS AF179746 484 bp DNA PRI 31-DEC-2000  
 DEFINITION *Hylobates lar* olfactory receptor (HLA129) gene, partial cds.  
 ACCESSION AF179746  
 KEYWORDS  
 SOURCE common gibbon.  
 45 ORGANISM *Hylobates lar*  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hylobatidae; *Hylobates*.  
 REFERENCE 1 (bases 1 to 484)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 50 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 484)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 55

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 5 source 1..484  
 /organism="Hylobates lar"  
 /db\_xref="taxon:9580"  
 gene <1..>484  
 /gene="HLA129"  
 10 CDS <1..>484  
 /gene="HLA129"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICHPLHYATIMSQSQCVMLVAGSWVIACACALLHTLLAQLS  
 FCADHIIPHFFCDLGALLKLSCTFLNELVMFTGVVVITLPFMCILSYGYIGATI  
 15 LRVPSTKGHAKSTCGSHLSVVSLYYGSIFGQYLPTASSSIDKDVIVAVMYTVITPM  
 L" (SEQ ID NO:204).  
 BASE COUNT 85 a 139 c 111 g 149 t  
 ORIGIN  
 20 1 tgggccatc tgtcacccctc tacattatgc caccatcatg agtcagagcc agtgtgtcat  
 61 gctgggtggc gggcctggg tcatcgcttg tgcggtgtgt ctttgcata ccctccctct  
 121 ggcccagctt tcctttgtg ctgaccacat catccctac ttcttctgtg accttgggtc  
 181 cctgctcaag ttgcctgtc cagataccctt cctcaatggat ctggcatgt tcacagttagg  
 241 ggtgggtggc attaccctgc cattcatgtg tatctggta tcatatgggtt acattggggc  
 301 caccatccgt agggccctt caaccaaagg gatccacaaa gcgtccacgt gtggctccca  
 361 tctttctgtg gtgtctctt attatgggtc aatatttggc cagttacccctt tccccgaccgc  
 421 aacagatcc attgacaagg atgtcatgtt ggctgtcatg tacacagtga tcacacccat  
 481 gttg (SEQ ID NO:203).

## OR126

30 LOCUS AF179747 486 bp DNA PRI 31-DEC-2000  
 DEFINITION Hylobates lar HLA130 pseudogene, partial sequence.  
 ACCESSION AF179747  
 KEYWORDS .  
 35 SOURCE common gibbon.  
 ORGANISM Hylobates lar  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
 REFERENCE 1 (bases 1 to 486)  
 40 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 486)  
 45 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 50 source 1..486  
 /organism="Hylobates lar"  
 /db\_xref="taxon:9580"  
 gene <1..>486  
 /gene="HLA130"  
 55 /pseudo

BASE COUNT 95 a 142 c 94 g 155 t  
 ORIGIN  
 1 tgtggccatc tgtcacccct tacattatgc accatcatga gtcagagcca gtgtgtcatg  
 61 ctgggtgtg ggtctgggt catcgctgt gcgtgtgtc tttgcatac cctcttcgt  
 121 gccccagttt ccctttgtgc tgaccacatc atccctcaact tttctgtga ccttggcc  
 181 ctgtcaagt tgctctgtc agataccctcc ctaaatcagt tgccaatctt tacagcagga  
 241 ttgacagcca ttatgtctcc attcttgtgc atcctgtttt ctatgtgtca cattggggtc  
 301 accatccctcc agatccccctc tccaaggcc atatgcaaaag ctttgtccat ttgtggatcc  
 361 cacctctcag tggtgactat ctatatggg acaaattatg gtctctattt tttccccca  
 421 tccagcaaca ccaatgacaa gaacataatt gttcgtgtga tatacacagt agtcactccc  
 481 atgtt (SEQ ID NO:205).

OR127

15 LOCUS AF179748 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Hylobates lar olfactory receptor (HLA131) gene, partial cds.  
 ACCESSION AF179748  
 KEYWORDS  
 20 SOURCE common gibbon.  
 ORGANISM Hylobates lar  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
 REFERENCE 1 (bases 1 to 487)  
 25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 30 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 35 source 1..487  
     /organism="Hylobates lar"  
     /db\_xref="taxon:9580"  
 gene <1..>487  
     /gene="HLA131"  
 CDS <1..>487  
     /gene="HLA131"  
     /codon\_start=2  
     /product="olfactory receptor"  
     /translation="VAICRPLYYPVIMKPHLCGLLVLVSWFLSLSYSLIQSLLMLRVS  
     FCTSWVIQHFYCELAQVLTACSDTHINYILLYMVTGLGFVPFGILFSYTQIVSSI  
 45  
 LRISSPDGKHAKFSTCGSHLSVSLFYGTGLGVYLSSNASSSSWRGMVASVMYTVVTP  
     NV" (SEQ ID NO:207).  
 BASE COUNT 80 a 145 c 106 g 156 t  
 ORIGIN  
 50 1 tgtggccatc tgtcgcccccc tgtactaccc tgtcatcatg aaacctcacc tctgtggcc  
 61 gctggttctt gtgcctgggt tcctcagctt gtcatactcc ctgatccaga gtctgttgat  
 121 gctgccccgt tccttctgc ccagtgggt cattcagcac ttatctgtg agcttgtca  
 181 ggtctcaca cttgcctgtc cagacacaca catcaattac atcctgtct acatgggtac  
 241 cggccttttg ggctttgtgc cttctcagg gatccctttc tctcacaccc aaatgtctc  
 301 ctccatctgc agaatctcat ccccaagatgg gaaacacaaaa gcctttctca cctgtggatc

361 tcatctgtct gtggtttctt tattctatgg gacaggctt ggcgtgtatc ttagttccaa  
421 tgcatacgccc tcttcctggc ggggcatggt ggcttcggta atgtacactg tggtaacccc  
481 caatgtg (SEQ ID NO:206).

5

## OR128

LOCUS AF179749 487 bp DNA PRI 31-DEC-2000  
DEFINITION Hylobates lar olfactory receptor (HLA132) gene, partial cds.  
ACCESSION AF179749  
10 KEYWORDS .  
SOURCE common gibbon.  
ORGANISM Hylobates lar  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hylobatidae; Hylobates.  
15 REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
20 REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
25 FEATURES Location/Qualifiers  
source 1..487  
/organism="Hylobates lar"  
/db\_xref="taxon:9580"  
gene <1..>487  
30 /gene="HLA132"  
CDS <1..>487  
/gene="HLA132"  
/codon\_start=2  
/product="olfactory receptor"  
35 /translation="VAICHPLHYATIMSQSQCVMLVAGSWVIACACALLHTLLAQSL  
FCADHIIIPFFCDLGALLKLSCSDTSLNQLAIFTAGLTAIMPLFLCILVSYGHIGVTI  
LQTPSTKGICKALSICGSHLSVVTIYYGTIIGLYFLPPSSNTNDKNIIASVIYTVVTP  
ML" (SEQ ID NO:209).  
40 BASE COUNT 95 a 144 c 94 g 154 t  
ORIGIN  
1 tggtggccatc tgtaacccttc tacattatgc caccatcatg agtcagagcc agtgtgtcat  
61 gctgggtggctt gggcctgggg tcatcgcttg tgcgtgtgt ctttgcata ccctccctct  
121 gccccagctt tccctttgtg ctgaccacat catccctc ac ttcttctgtg accttgggtgc  
181 cctgctcaag ttgtccctgtc cagataacctc ctcataatcg ttggcaatct ttacagcagg  
45 241 attagacagcc attatgcctc catttcgttg cattccgtt tcttatggtc acatggggat  
301 caccatcttc cagactccctt ctcacaaggc catafcaaa gccttgcata ttgtggatc  
361 ccacctctca tggtgtacta ttattatgg gacaattt ggtctctatt ttctcccc  
421 atccagcaac accaatgaca agaacataat tgcttcagtg atatacacag tagtcactcc  
481 catgttg (SEQ ID NO:208).  
50

## OR129

LOCUS AF179750 487 bp DNA PRI 31-DEC-2000  
DEFINITION Gorilla gorilla olfactory receptor (GGO100) gene, partial cds.  
ACCESSION AF179750

**KEYWORDS**  
**SOURCE** gorilla.  
**ORGANISM** Gorilla gorilla  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 5 Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
**REFERENCE** 1 (bases 1 to 487)  
**AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
**TITLE** The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
**JOURNAL** Unpublished  
**REFERENCE** 2 (bases 1 to 487)  
**AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
**TITLE** Direct Submission  
**JOURNAL** Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 10 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
**FEATURES** Location/Qualifiers  
 source 1..487  
     /organism="Gorilla gorilla"  
     /db\_xref="taxon:9593"  
 15 gene <1..>487  
     /gene="GGO100"  
 CDS <1..>487  
     /gene="GGO100"  
     /codon\_start=2  
 20 /product="olfactory receptor"  
     /translation="VAICHPLHYTFIMDQNTCIQLAVISWSSFLCSMVINVLTLSLP  
     YCGPNILNHFFCEVPTVRLSCTDTSFTELVVFIFSIIIVFIPFLLIVVSYVRILQSV  
 25  
 LRMRSASGRYKALSTCTSHLTVVTLFYGTAIMYMRPQSRSSWAGGKIIAVFYTVVTP  
 30 ML" (SEQ ID NO:211).  
**BASE COUNT** 91 a 130 c 97 g 169 t  
**ORIGIN**  
 35 1 tgtagccatt tgtcatccctc ttcaattatac ctccattatg gaccaaaca cctgcattca  
 61 actggcagg ttacttggc ccagtagcctt cctgtgttcc atggtttatca atgttcac  
 121 gttagtttg ccctactgtg ggccataat cctgaatcac ttttctgtg aggtaccc  
 181 tgtcctgagg ttgttttgc ccgacaccc attcacggag ctgggtgtt ttatcttcag  
 241 tatcatcatt gtcctcatcc ctccctctt catttgttgc tcctatgtcc ggatcc  
 301 atctgttctc aggatgcggg cagcctccgg gcggtaaag gcattatcca cctgtacc  
 361 ccatttgaca gtggtaacct tattttatgg gactgccatc ctatgtaca tgagaccaca  
 40 421 gtgcagggtct tcctgggctg gcccgaagat cattgcggtt ttctacacgg tggcacacc  
 481 catgctt (SEQ ID NO:210).

### OR130

45 **LOCUS** AF179751 488 bp DNA **PRI** 31-DEC-2000  
**DEFINITION** Gorilla gorilla GGO101 pseudogene, partial sequence.  
**ACCESSION** AF179751  
**KEYWORDS**  
**SOURCE** gorilla.  
 50 **ORGANISM** Gorilla gorilla  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
**REFERENCE** 1 (bases 1 to 488)  
**AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
**TITLE** The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 488)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

<b>FEATURES</b>	<b>Location/Qualifiers</b>
source	1..488
	/organism="Gorilla gorilla"
	/db_xref="taxon:9593"
gene	<1..>488
	/gene="GGO101"
	/pseudo
<b>BASE COUNT</b>	91 a 144 c 113 g 140 t
<b>ORIGIN</b>	
	1 tgtggccatt agccacccac ttcaactatcc catcctcatg aatcagaggg ttcgtctcca
	61 gattaccggg agctcctggg ctttggat aatcgatggc ttgtatccag atggtggtag
	121 taatgaattt cccctactgt ggcttgaggaa aggttgaacca ttcttcgtt gagatgtat
	181 ctttgttcaa gctggccctgt tgatcacat ccctgttttga gaagggtata ttgtttgtct
	241 gtgttcatgtt ctcttccttc ccattctcca tcatcggtgc ctccatgtct cgcattctag
	301 ggactgtgtcgtt gcaaatgtcac tctgtcagg cttggaaaaaa ggccctggcc acctgtctt
	361 cccacctgac agctgtcacc ctcttctatg gggcagccat gtcatctac ctgaggccata
	421 ggcgttccatggc ggccccccatggc catgacaagg tggctctat ctcttacaca gtccttactc
	481 ccatgtgt (SEQ ID NO:212).

OR131

LOCUS AF179752 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Gorilla gorilla olfactory receptor (GGO102) gene, partial cds.  
 ACCESSION AF179752  
 KEYWORDS .  
 SOURCE gorilla.  
 ORGANISM Gorilla gorilla  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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         /db\_xref="taxon:9593"  
     gene <1..>487  
         /gene="GGO102"  
     CDS <1..>487  
         /gene="GGO102"  
         /codon\_start=2

/product="olfactory receptor"  
/translation="VVICHPLHYTVIMREEFCVFLAVSWILSCASSLSHTVLLTQLS  
FCAANTIPHVFCDLAALLKLSCSDIFLNELVMTVGVVVITLPFMCLVSYGYIGATI  
LGVPSTKGIIHKALSTCGSHLSVVSLYYGSIFGQYLFP-TVSSFIDKDVIDVALMYTVVTP  
TL" (SEQ ID NO:214).  
BASE COUNT 87 a 137 c 106 g 157 t  
ORIGIN  
1 tgttgtcata tgtcacccctc tccactacac tgtcatcatg agggaaagagt tctgtgtctt  
61 cttagtggtct gtatcttggta ttctgtcttg tgccagctcc ctctctcaca ccgttcttc  
121 gaccctgggt cttttctgtg ctgcgaacac catccccat gtcttctgtg accttgc  
181 cctgctcaag ctgtcctgtc cagatatttc cctcaatgag ctggcataatgt tcacaggagg  
241 gggtgggtgc attaccctgc catgtatgtt tatctctgtt tcatatgggtt acatggggc  
301 caccatctgtt ggggtccctt caaccaaagg gatccacaaa gcatgttcca catgtggctc  
361 ccatctctctt gtgggtgttc tcttattatggt gtcataatattt ggccagttacc ttttcccgac  
421 tggatgttgcata aggatgtatgtt tggttgttc atgtacacgg tggtcacacc  
481 cacgttg (SEQ ID NO:213).

OR132

20 LOCUS AF179753 488 bp DNA PRI 31-DEC-2000  
 DEFINITION Gorilla gorilla GGO103 pseudogene, partial sequence.  
 ACCESSION AF179753  
 KEYWORDS .  
 SOURCE gorilla.  
 25 ORGANISM Gorilla gorilla  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
 REFERENCE 1 (bases 1 to 488)  
 30 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 488)  
 35 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 40 source 1..488  
     /organism="Gorilla gorilla"  
     /db\_xref="taxon:9593"  
 gene <1..>488  
     /gene="GGO103"  
     /pseudo  
 45 BASE COUNT 86 a 149 c 108 g 145 t  
 ORIGIN  
     1 tgccgctgtc tgccacccac tcggatatcc cacttcatacg agctggcagc tggccctgag  
     61 gataaccatg ttgtcttgc tcctgggtgc agctgacggg ctcatgcagg ctgttgcata  
     121 cctgagcttc ccatatgtcg gtgcacacga gatcgatcac ttcttgcg aggcccccg  
     181 gctgggttcat ttggcttgtc ctgacatcc agtcttcgaa aacgccatg acatctgtc  
     241 tgtgttaatg ctccctggcc cttttccct catctgtcc tccttatggtc tcattctcg  
     301 tgctgttcg cacatgcgtc ctacagaagc ccgcaagaag gcctttgcca cctgcgttc  
     361 acatttggct gtggtgggac tctttatgg agctgcattt ttacacctata tgagacccaa  
     421 atccccacagg tccactaacc acgataagggt tttttatggc agtgcattt ttacacctata tgagacccaa  
     481 ttactaa (SEQ ID NO:215).

### OR133

5 LOCUS AF179754 458 bp DNA PRI 31-DEC-2000  
DEFINITION Gorilla gorilla GGO104 pseudogene, partial sequence.  
ACCESSION AF179754  
KEYWORDS  
SOURCE gorilla.  
10 ORGANISM Gorilla gorilla  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
REFERENCE 1 (bases 1 to 458)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
15 Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 458)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
20 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..458  
/organism="Gorilla gorilla"  
25 /db\_xref="taxon:9593"  
gene <1..>458  
/gene="GGO104"  
/pseudo  
BASE COUNT 89 a 139 c 88 g 142 t  
30 ORIGIN  
1 ccaccatcat gagtcacagc cagtgtgtca tgctggtgcc tgggtcctgg gtcatcggtt  
61 gtgcgtgtgc tctttgtat accctccccc tgccccggct ttccctctgt gctgaccaca  
121 tcateccctca ctcttcgtgt gaccttgggtg cccctgtcaa gttgtcctgc tcagacacct  
181 cccccaatca gttagcaatc tttagcaggc gattgacagc cattatgttt ccattcctgt  
241 gcatcctgggt ttcttatggt cacattgggg tcaaccatctt ccagattcccc tctaccaagg  
301 gcatatgcaa agccctgtcc acttgtggat cccacacttc agtggtgact atctattatg  
361 ggacaattat tggtctctat ttcttcccc catctgcaa caccatgtac gagaacataaa  
421 ttgcttcaggat gatatacaca gtgtcactc ccatattg (SEQ ID NO:216).

### 40 OR134

LOCUS AF179755 477 bp DNA PRI 31-DEC-2000  
DEFINITION Gorilla gorilla olfactory receptor (GGO106) gene, partial cds.  
ACCESSION AF179755  
45 KEYWORDS  
SOURCE gorilla.  
ORGANISM Gorilla gorilla  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
REFERENCE 1 (bases 1 to 477)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
55 REFERENCE 2 (bases 1 to 477)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
5 FEATURES Location/Qualifiers  
source 1..477  
/organism="Gorilla gorilla"  
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gene <1..>477  
10 /gene="GGO106"  
CDS <1..>477  
/gene="GGO106"  
/codon\_start=2  
/product="olfactory receptor"  
15 /translation="VAIRKPLHYLVIMRQWVVCVLLVMSWVGFLHSVFQLSIYGLP  
FCGPNVIDHFFCDMYPLLKLVCTDTHVIGLTVTNGGLSCTIVFLLLISYGVILHSL  
KKLSQKGRQKALSTCSSHITVVVFFVPCIFMYARPARSFPIDKSVSVFYTVPML"

(SEQ ID NO:218).

20 BASE COUNT 100 a 108 c 100 g 169 t

ORIGIN

1 tggccatc cgtaagccct tgcattattt ggttatcatg agacaatggg tgggttgt  
61 gtcgtgtta atgtcctggg ttggaggatt tctgcactca gtatttcaac ttagcattat  
121 ttatggctc ccattctgtg gccccaaatgt cattgatcac ttttctgtg acatgtatcc  
181 cttaatgaaa ctggctgcga ctgacaccca tggatggc ctcttagtg tgaccaatgg  
241 aggactgtct tgcactatgg tggatggc cttaatgtatgg tcataatgtca  
301 ctctctaaag aaacttagtc agaaaggag gaaaaagcc ctctcaacct gcagttccca  
361 catcaatgtg gttgtttct tctttgttcc ttgtatgtt atgtatgtca gacctgttag  
421 gagttcccc attgacaaaat cagtggatgt gttttataca gtcataaccc caatgtc (SEQ ID NO:217).

### 30 OR135

LOCUS AF179756 488 bp DNA PRI 31-DEC-2000  
DEFINITION Gorilla gorilla olfactory receptor (GGO107) gene, partial cds.

ACCESSION AF179756

35 KEYWORDS .

SOURCE gorilla.

ORGANISM Gorilla gorilla

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Gorilla.

40 REFERENCE 1 (bases 1 to 488)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

JOURNAL Unpublished

45 REFERENCE 2 (bases 1 to 488)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

50 FEATURES Location/Qualifiers

source 1..488  
/organism="Gorilla gorilla"  
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gene <1..>488  
55 /gene="GGO107"

CDS <1..>488  
   /gene="GGO107"  
   /codon\_start=2  
   /product="olfactory receptor"  
 5   /translation="LAICYPLHYGAMMSSLLSVQLALGSWVCGFMAIAVPTALISGLS  
   FCGPRAINHFFCDIAPWIALACTNTQAVELVAFVIAVVVLSSCLITLVSYVYIISTI  
   LRIPSASGRSKAFSTCSSHLTVLIWYGSTIFLHVRTSIKDALDLIKAVHVLNTVVTP  
   VL" (SEQ ID NO:220).  
 BASE COUNT 84 a 155 c 108 g 141 t  
 10 ORIGIN  
   1 tttggccatc tggatccctt tacactacgg agccatgatg agtagcctgc ttcagtgca  
   61 gttggccctg ggctcctggg ttgtggttt catggccatt gcagtgccta cagccctcat  
   121 cagtggccctg tccttctgtg gcccccggtc catcaaccac ttcttctgtg acattgcacc  
   181 ctggattgcc ctggccgtca ccaacacaca ggcagtagag ctgtggccct ttgtgattgc  
 15 241 tggttgtgtt atccctgagtt caigccatc cacccttgtc tcctatgtt acatcatcag  
   301 caccatcctc aggatcccct cgccagtggtt ccggagcaaa gccttcctca cgtgctccctc  
   361 gcatctcacc tggtgtctca ttggatgtgg gcccacaatt ttccctcacg tccgacaccc  
   421 tatcaaagac gccttggatc tgatcaaaggc tgccacgtc ctgaacactg tggtgactcc  
   481 agtttaa (SEQ ID NO:219).  
 20

### OR136

LOCUS AF179757 480 bp DNA PRI 31-DEC-2000  
 25 DEFINITION Gorilla gorilla GGO108 pseudogene, partial sequence.  
 ACCESSION AF179757  
 KEYWORDS  
 SOURCE gorilla.  
 ORGANISM Gorilla gorilla  
   Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 30   Eutheria; Primates; Catarrhini; Hominidae; Gorilla.  
 REFERENCE 1 (bases 1 to 480)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
   Evidence for reduction of function in primates  
 35 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 480)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 40   1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
   source 1..480  
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     /db\_xref="taxon:9593"  
 45   gene <1..>480  
     /gene="GGO108"  
     /pseudo  
 BASE COUNT 95 a 125 c 101 g 159 t  
 ORIGIN  
 50   1 tttggccgtt tgtaaccctc ttcttacac agttcaatg tcccaaggcc ttggctcctt  
   61 gtgggtggctt acatcatact gtggggggac agtctgttcc ctgacacctt cttttactgt  
   121 gaattatcct tcagaggaaat taatatcatt aataactttg tctgtgagca cgctgtcatt  
   181 gtgtgtgtt ctgtgttgc cccctatttg accaggaga tcaatgtttagt ttctgcac  
   241 attcaatgaa ataaggcagcc tggtgtatcat ttcacttcc tatgtttca ttttatc  
 55 301 tgtcatgaag acgccttcca ctggggggcg caagaaagcg ttctccacgt gtgcctccca

361 cttagacggcc attaccattt tccatgggac tatectttc ctctactgtg ttccctaactc  
421 aagttcgccg ctcatggtca aggtggcctc tgtctttgc acagtggtca ttcccatgtg (SEQ ID NO:221).

### OR137

5

LOCUS AF179758 487 bp DNA PRI 31-DEC-2000  
DEFINITION Gorilla gorilla olfactory receptor (GGO109) gene, partial cds.  
ACCESSION AF179758

KEYWORDS .

10

SOURCE gorilla.

ORGANISM Gorilla gorilla  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Gorilla.

REFERENCE 1 (bases 1 to 487)

15

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

20

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

25

source 1..487  
/organism="Gorilla gorilla"  
/db\_xref="taxon:9593"  
gene <1..>487  
/gene="GGO109"  
CDS <1..>487  
/gene="GGO109"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICHPLHYATIMSHSQCVMLVAGSWVIACACALLHTLLARLS  
FCADHIIIPFFCDLGALLKLSCSDTSNLQALIFTAGLTAIMLPFLCILVSYGHIGVTI  
LQIPSTKGICKALSTCGSHLSVVTIYYGTIIGLYFLPPSSNTNDKIIASVIYTVVTP  
ML" (SEQ ID NO:223).

30

BASE COUNT 95 a 148 c 93 g 151 t

ORIGIN

40

1 tgtggccatc tgtcacccctc tacattatgc caccatcatg agtcacagcc agtgtgtcat  
61 gttttttttt ggggtttttt tcattttttt tttttttttt ttttttttttt ttttttttttt  
121 ggccggcgtt tccttctgtg ctgaccacat catccctcac ttcttctgtg accttgggtc  
181 cttgtcaag ttgtccctgtc cagacacactc ctcaaatcgt tttagcaatct ttacagcagg  
241 attgacagcc attatgtctc cattcctgtg catcctgggtt ttctatggtc acattgggg  
301 caccatcttc cagatccccctt ctaccaaggg catacgaa gccttgccca ctgtggatc  
361 ccaccttcga ctgtgtacta tctattatgg gacaattttt ggctctatt ttcttcccc  
421 atccageaac accaatgaca agaacataat tgcttcagtg atatacacag tagtcactcc  
481 catgttg (SEQ ID NO:222).

45

### OR138

50

LOCUS AF179759 487 bp DNA PRI 31-DEC-2000  
DEFINITION Homo sapiens olfactory receptor (HSA1) gene, partial cds.  
ACCESSION AF179759

KEYWORDS .

SOURCE human.  
 ORGANISM Homo sapiens  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Homo.  
 5     REFERENCE 1 (bases 1 to 487)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE The olfactory receptor gene repertoire in primates and mouse:  
         Evidence for reduction of function in primates  
     JOURNAL Unpublished  
 10    REFERENCE 2 (bases 1 to 487)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE Direct Submission  
     JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
         1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 15    FEATURES Location/Qualifiers  
     source    1..487  
               /organism="Homo sapiens"  
               /db\_xref="taxon:9606"  
     gene      <1..>487  
 20      /gene="HSA1"  
     CDS       <1..>487  
               /gene="HSA1"  
               /codon\_start=2  
               /product="olfactory receptor"  
 25      /translation="VAICNPLLYPVVMSNKLSAQQLSISYVIGFLHPLVHVSSLRLT  
               FCRFNIIHYFYCEILQLFKISNGPSINALIIFIFGAFIQIPTLMTHIISYTRVLFDI  
               LKKSEKGRSKAFSTCGAHLLSVSLYYGTLIFMYVRPASGLAEDQDKVYSLFYTIIP  
               LL" (SEQ ID NO:225).  
 30    BASE COUNT 131 a 105 c 77 g 174 t  
 ORIGIN  
     1 ttagccata tgaatccct tgcttatcc agtggatgatg tccaacaaac tcagcgctca  
     61 gttgctaagt attccatatg taattggttt cctgcatct ctggttcatg tgaggttact  
     121 attcgcacta atttctgcata ggttaacat aatacattat ttctactgtg aaattttaca  
     181 actgttcaaa atttcatgcata atggccatc tattaacgcata ctaataatat ttatttttg  
 35      241 tgctttata caaaatcccc tttaatgac tttatataatc ttcttataactc gtgtgtctt  
     301 tgatattctg aaaaaaaaagt ctgaaaaggc cagaagcaaa gcctctcca catcgccgc  
     361 ccatctgcctt tctgtctcat ttactacgg aactctgtatc ttcatgtatg tgcgtccctgc  
     421 atctggctta gctgaagacc aagacaaaat gtattcttg ttttacacga ttataattcc  
     481 cctgctta (SEQ ID NO:224).  
 40

### OR139

LOCUS AF179760 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Homo sapiens olfactory receptor (HSA10) gene, partial cds.  
 45     ACCESSION AF179760  
 KEYWORDS  
 SOURCE human.  
 ORGANISM Homo sapiens  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Homo.  
 50     REFERENCE 1 (bases 1 to 487)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE The olfactory receptor gene repertoire in primates and mouse:  
         Evidence for reduction of function in primates  
     JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 5 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Homo sapiens"  
 /db\_xref="taxon:9606"  
 10 gene <1..>487  
 /gene="HSA10"  
 CDS <1..>487  
 /gene="HSA10"  
 /codon\_start=2  
 15 /product="olfactory receptor"  
 /translation="VAICHPLHYTVIMREELCVFLAVSRILSCASSLSHTLLTRLS  
 FCAANTVPHVFCDLAALLLSCSDIFLNELVMTVGVVVITLPFMCLVSYGYIGATI  
 LRPVPSTKGHIHKALSTCGSHLSVSVSYYYGSIFGQYLFPVTSSSIDKDVIVALMYTVDTTP  
 ML" (SEQ ID NO:227).  
 20 BASE COUNT 87 a 142 c 106 g 152 t  
 ORIGIN  
 1 tggccata tgcaccctc tecactacac tgtcatcatg agggaaagacg tctgtgtctt  
 61 cttagtggtc gtatctcgga ttctgtctt tgccagctcc ctcttcaca ccctttccct  
 121 gacccggctg tctttctgtg ctgcgaacac cgtccccat gcttctgtg accttgc  
 25 181 cctgctcaag ctgtctgtc cagatatctt cctaatgag ctggcatgt tcacagttagg  
 241 gggtgggtc attaccctc cattcatgtg tatctgtta tcatatggc acatggggc  
 301 caccatctg agggccctt caaccaaagg gatccacaaa gcattgtcca catgtggctc  
 361 ccatctctt gtgggtctc tctattatgg gtcaatattt ggccagtacc tttcccgac  
 421 tgtaaggcgt tctattgaca aggatgtcat tggcgtctc atgtacacgg tggcacacacc  
 481 catgttg (SEQ ID NO:226).

## OR140

LOCUS AF179761 487 bp DNA PRI 31-DEC-2000  
 35 DEFINITION Homo sapiens olfactory receptor (HSA12) gene, partial cds.  
 ACCESSION AF179761  
 KEYWORDS .  
 SOURCE human.  
 ORGANISM Homo sapiens  
 40 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Homo.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 45 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 50 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..487  
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 /db\_xref="taxon:9606"

gene <1..>487  
 /gene="HSA12"  
 CDS <1..>487  
 /gene="HSA12"  
 5 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICFPLHYTAIMSPMLCLALVALSWVLTTFHAMLHTLLMARLC  
 FCADNVIPHFFCDMSALLKLA  
 FSDTRVNEWVIFIMGGLILVIPFLLILGSYARIVSSI  
 LKVPSKGICKALSTCGSHLSVSLFYGTIVGLYLCSSANSSTLKD  
 TVMAMMYTVVTP  
 10 ML" (SEQ ID NO:229).  
 BASE COUNT 85 a 141 c 103 g 158 t  
 ORIGIN  
 11 1 tgtggccatc tgctcccccc tgeactacac cgccatcatg agccccatgc tctgtctgc  
 12 61 cctggcgcc ctgtcctggg tgcgtaccac ctccatgcc atgttacaca ctttactcat  
 13 121 gcccagggtg ttttttgttg cagacaatgt gatccccac ttttttgttg atatgtctgc  
 14 181 tctgtctggaa ctggcccttc ctgcacactcg agttaatgaa tgggtgatat ttatcatggg  
 15 241 agggtctt cttgtcatcc catctact catccttggg tcctatgcaaa gaattgtctc  
 16 301 ctccatccctc aagggtccctt cttctaagggg tatctgcaag gcccctctca ctgtggctc  
 17 361 ccacctgtt gtgggtgtcac tggctatgg aaccgtttt ggtctctact tatgtctcatc  
 18 421 agttaatagt tctactctaa aggacactgt catggctatg atgtacactg tgggtgacc  
 19 481 catgttg (SEQ ID NO:228).

### OR141

25 LOCUS AF179762 486 bp DNA PRI 31-DEC-2000  
 DEFINITION Homo sapiens HSA13 pseudogene, partial sequence.  
 ACCESSION AF179762  
 KEYWORDS .  
 SOURCE human.  
 30 ORGANISM Homo sapiens  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Homo.  
 REFERENCE 1 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 35 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 40 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..486  
 45 /organism="Homo sapiens"  
 /db\_xref="taxon:9606"  
 gene <1..>486  
 /gene="HSA13"  
 /pseudo  
 50 BASE COUNT 108 a 139 c 96 g 143 t  
 ORIGIN  
 1 1 cgtggctgtg tgtaacccccc tcctctatgc catagtcatg acaccaatga cccgcctggc  
 2 61 gctgtggcc ggggcatattt ctgggtccat agtcaattctt gtgtatgtca ctggctgcac  
 3 121 ctctctatc tccttcatac agtccaacca ttagacttc ttttttgtg acctccacc  
 4 181 cttgtctggaa ctgtcctgtatgtt gtttttgtt accttcac  
 5 181 cttgtctggaa ctgtcctgtatgtt gtttttgtt accttcac

241 tttctggc atcacacca gcatttcagt gattttaca tcgtacttgt tcatacattca  
301 gtctattctg aagatcgta cagcagggtgg aaagccaaga ccttctccac ctgtgcctct  
361 cacaagactg cattgactct ctctttgga acactcatat tcatacatct gaaaggcaac  
421 atggcgaat cccttgagga agacaagatc gtgtcaatat ttacactgt ggtcatcccc  
5 481 atgcta (SEQ ID NO:230).

## OR142

LOCUS AF179763 487 bp DNA PRI 31-DEC-2000  
10 DEFINITION Homo sapiens HSA16 pseudogene, partial sequence.  
ACCESSION AF179763  
KEYWORDS  
SOURCE human.  
ORGANISM Homo sapiens  
15 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Homo.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
20 Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
25 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..487  
/organism="Homo sapiens"  
30 /db\_xref="taxon:9606"  
gene <1..>487  
/gene="HSA16"  
/pseudo  
BASE COUNT 111 a 110 c 96 g 170 t  
35 ORIGIN  
1 catggccatt gtgaaccctt tactttatac agtagctatg actaaaatag tttgtattgt  
61 gctcgcatgtt gggcatgtt tggtgggtttt aatcgatctca ttgacacata caattggctt  
121 ggtgaaactg tcittctgtt ggccaaatgt catcgtcac ttcttctgtt atcttcccc  
181 actgttgaag ctgtcatgtt ctgagacatc tatgaatgaa ttgtgtttt tgatcttctc  
40 241 tggcattt gccacgtca ctttttgc tttgtgtatc ttctacatct tcattgttgc  
301 tgctatctgtt aggatccgtt aagaagcagg tagacgtaaa gccttctcca ctgcaccc  
361 tcacctgtt accgtgacctt tattctatgg atcgataagc tttagttaca tttagccaaa  
421 tcctccaggat tccctagaac aagaaaagggt ggtgtctgtt ttatcaccc ttgtgggttcc  
481 tatgtta (SEQ ID NO:231).  
45

## OR143

LOCUS AF179764 485 bp DNA PRI 31-DEC-2000  
50 DEFINITION Homo sapiens HSA18 pseudogene, partial sequence.  
ACCESSION AF179764  
KEYWORDS  
SOURCE human.  
ORGANISM Homo sapiens  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
55 Eutheria; Primates; Catarrhini; Hominidae; Homo.

REFERENCE 1 (bases 1 to 485)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 5     JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 485)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 10     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES     Location/Qualifiers  
     source     1..485  
               /organism="Homo sapiens"  
               /db\_xref="taxon:9606"  
 15     gene     <1..>485  
               /gene="HSA18"  
               /pseudo  
 BASE COUNT   90 a  116 c  106 g  173 t  
 ORIGIN  
 20     1 cgtggcata tgtaacccac tgggtacac ggtcaccatg tctccccaga agtgtttgct  
       61 ccttttactg ggtgttatg ggatggggat ttggggctgt tggctcatat gggaaacata  
       121 atgtttatgt ccttttggtt agacaacacctt gtcaatcaact atatgtgtga catccttcct  
       181 ctccctgagc tctccctgaa cagctttac ataatttgc tgggttttatttttgt  
       241 accgttggca ttgggtgcc gattgtcacc attttctctt cttatgggttattcttcc  
 25     301 agcattctcc acatttagttc cacagaggc aggctaaag ccttcagttac ctgcagttcc  
       361 cacataattt tggatcgct ttcttgggtt caggtgcattt catgtacccaaaccaccc  
       421 ctattctacc cctggaccag gggaaagtgt cttccatttt ttgtactgct gtgggtgccca  
       481 tgttt (SEQ ID NO:232).

### 30     OR144

LOCUS AF179765 486 bp DNA     PRI 31-DEC-2000  
 DEFINITION Homo sapiens HSA2 pseudogene, partial sequence.  
 ACCESSION AF179765  
 35     KEYWORDS .  
 SOURCE human.  
 ORGANISM Homo sapiens  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Homo.  
 40     REFERENCE 1 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 45     REFERENCE 2 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 50     FEATURES     Location/Qualifiers  
     source     1..486  
               /organism="Homo sapiens"  
               /db\_xref="taxon:9606"  
 55     gene     <1..>486  
               /gene="HSA2"

/pseudo  
 BASE COUNT 88 a 117 c 107 g 174 t  
 ORIGIN  
 1 cgccccatc tgtaacccac tggcacatc tctcccaaga tgggttgct  
 61 cctttactg ggtgtatcg gggggggat ttggggctg tggctatcat gggaaacata  
 121 atgtttatgt ctttttgtgg agacaacccat gtcaatcaatc atatgtgtga catcccttc  
 181 cccttgagc cctctgaa cagctttac ataatttgc tgggtgtttt tattattgtg  
 241 accgtggca tgggggtgcc gattgtcacc atttttctt cttaggtttt tattttcc  
 301 agcattctcc acatttagtc cacagaggcc aggtctaaag cctcagtgac ctgcagttcc  
 361 cacataatttgc tggatcgct ttctttggg tcagggtgc tcatgttacct caaaccaccc  
 421 tctattctac ccctggacca gggggaaatgt tccctccat ttttgtactgc tgggtggcc  
 481 atgtt, (SEQ ID NO:233).

OR145

LOCUS AF179766 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Homo sapiens olfactory receptor (HSA3) gene, partial cds.  
 ACCESSION AF179766  
 KEYWORDS .  
 SOURCE human.  
 ORGANISM Homo sapiens  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Homo.  
 REFERENCE 1 (bases 1 to 487)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE The olfactory receptor gene repertoire in primates and mouse:  
         Evidence for reduction of function in primates  
     JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE Direct Submission  
     JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
         1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..487  
         /organism="Homo sapiens"  
         /db\_xref="taxon:9606"  
     gene <1..>487  
         /gene="HSA3"  
     CDS <1..>487  
         /gene="HSA3"  
         /codon\_start=2  
         /product="olfactory receptor"  
         /translation="VAICKPLHYVVIMNNRVCTLLVLCCWVAGLMIIVPPLSLGLQLE  
             FCDSNAIDHFSCDAGPLLKISCSDTWVIEQMVLMAVFALIITPVCVILSYLYIVRTI  
             LKFPSPVQQRKKAFSTCSSHMIVVSIAYGSCIFYIKPSAKDEVAINKGVSVLTTSVAP  
             LL" (SEQ ID NO:235).  
 BASE COUNT 114 a 113 c 97 g 163 t  
 ORIGIN  
     1 tgtggccatc tgtaaacccc ttcatatgt ggtcatcatg aacaacaggg tgtgtaccc  
     61 attagtctc tgctgtggg tggctggctt gatgtatc gttccaccac ttagcttgg  
     121 cctccagtc gaattctgt actccaatgc cattgtatcat tttagctgt atgcaggatcc  
     181 tctctaaag atctcatgtc cagatacatg ggtatagaa cagatggta tacatgtgc  
     241 tgtatttgca ctcattatca cccccaggtt tggttacttgc tcctacttgt acatagtcc  
     301 aacaattctg aagtccctt ctgttcagca aaggaaaaag gcctttcta cctgttcatc

361 ccacatgatt gtggttcca ttgcctatgg aagctgcac tcacatctata tcaaggccctc  
421 tgcaaaagat gaggtggcca taaataaagg agtttcagtt cttaactactt ctgtcgacc  
481 ctgttg (SEQ ID NO:234).

5   **OR146**

LOCUS   AF179767   487 bp   DNA   PRI   31-DEC-2000  
DEFINITION Homo sapiens olfactory receptor (HSA5) gene, partial cds.  
ACCESSION AF179767

10   KEYWORDS .

SOURCE   human.

ORGANISM   Homo sapiens

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Homo.

15   REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE   The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL   Unpublished

20   REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE   Direct Submission

JOURNAL   Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

25   FEATURES   Location/Qualifiers

source   1..487

/organism="Homo sapiens"  
/db\_xref="taxon:9606"

gene   <1..>487

/gene="HSA5"

CDS   <1..>487

/gene="HSA5"

/codon\_start=2

/product="olfactory receptor"

35   /translation="VAICHPLHYTVIMREELCVFLAVTWILSCASSLSHTLLLRLS

FCAANTIPHVFCDLAALLKLSCSDIFLNEVMFTVGVVVITLPFMCLVSYGYIGATI  
LRVPSTKGHIKALSTCGSHLSVVSLYYGSIFGQYLFP-TVSSSIDKDVIDVALMYTVVTP  
ML" (SEQ ID NO:237).

BASE COUNT   88 a   141 c   105 g   153 t

40   ORIGIN

1 tggccata tgccatcctc tccactacac tgcatcatg agggaaagacg tctgtgtctt  
61 cttagtggct gtaacttgga ttctgtcttg tgccagtc cctctcaca cccttctcct  
121 gacccggctg tcttctgtg ctgcgaacac catccccat gtctctgtg accttgc  
181 cctgcctaag ctgcctgct cagatatctt cctcaatgag ctggcatgt tcacagtgg  
241 ggtgggtggc attaccctgc cattcatgt tatccctggta tcataatggct acatggggc  
301 caccatctctg agggccctt caaccaaagg gatccacaaa gatgtgtccaa catgtggctc  
361 ccatctctct gtgggtgtctc tctattatgg gtcataatattt ggcaggatacc tttcccgac  
421 tgtaaggcgt tctattgtaca aggatgtcat tggtggcttc atgtacacgg tggcacacc  
481 catgttg (SEQ ID NO:236).

50

**OR147**

LOCUS   AF179768   478 bp   DNA   PRI   31-DEC-2000

DEFINITION Homo sapiens HSA6 pseudogene, partial sequence.

55   ACCESSION AF179768



/organism="Homo sapiens"  
 /db\_xref="taxon:9606"  
 gene <1..>488  
 /gene="HSA7"  
 /pseudo  
 5 BASE COUNT 95 a 141 c 103 g 149 t  
 ORIGIN  
 1 catggccatc tgcaagccct ttttatatgg aagcaaaaatg accagggtgt tctgcctctg  
 61 tctggctgc gtcctata ttatggctt tgcaaattgtt ctaagcacag accaccctga  
 10 121 tgcctcgctt gtcctctgtt ggacccaatg acatcaacca ctttactgtt gggacccac  
 181 cccttttagt ctcgcgtgc tcagatactt atgtcaaaga gaccggcatg ttgggggtgg  
 241 ctggttccaa ctcatttgc tcttcacccg tcatcctcat ttccatcac ttcatctca  
 301 ctgcattctt gcgtatccac actgttgagg ggaggcgaa ggccttctcc acctgcgggt  
 361 ctcatgtgac cgctgtcaact gtcctctatg ggacactgtt ctgcatgtac ctgaggcccc  
 421 ctctgagac atctatacaa cagggaaaaa ttgttagtgtt tttttataatc ttgtgagtc  
 481 cgatgtta (SEQ ID NO:239).

### OR149

20 LOCUS AF179770 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Homo sapiens olfactory receptor (HSA8) gene, partial cds.  
 ACCESSION AF179770  
 KEYWORDS  
 SOURCE human.  
 25 ORGANISM Homo sapiens  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Homo.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 30 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 35 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..487  
 40 /organism="Homo sapiens"  
 /db\_xref="taxon:9606"  
 gene <1..>487  
 /gene="HSA8"  
 CDS <1..>487  
 45 /gene="HSA8"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICKPLHYTSIMNRKLCTLLVLCAWLSGFLTIFPPLMQLQLD  
 YCASNVIDHFACDYFPLLQLSCSDTWLLEVIGFYFALVTLLFTLALVILSYMYIIRTI  
 50 LRIPSASQRKKAFSTCSSHMIVISISYGSICIFMYANPSAKEASLTGIAILNTSVAP  
 ML" (SEQ ID NO:241).  
 BASE COUNT 115 a 119 c 80 g 173 t  
 ORIGIN  
 1 ttttgccatc tgcaagcccc ttcatcacat accatcatg aacaggaaac tctgcactt  
 55 61 acttgtgctgtgc taagtgggtt tctgaccatt ttcccaccc ttatgttctt

121 cctccagctg gattactgtg ctccaacgt cattgatcac ttgcgtgtg actattttcc  
181 cctttacaat ctatcttgtt cagatacatg gtccttagaa gtaattgggtt ttactttgc  
241 ttgggtact ttgcgttca ctttggcatt atgtatgtt tcttacatgt acattatcg  
301 gaccatttg agaatcccgt ctgccagtc aaaaaaaag gctttctcca ctgttcttc  
361 tcacatgatt gtcatttcca ttcttatgg aagctgtata ttcatgtatg ctaatccatc  
421 tgcaaaggaa aaggcatcat tgacaaaagg aatagctatt ctcatacat ctgtgcccc  
481 catgtg (SEQ ID NO:240).

## OR150

10 LOCUS AF179771 485 bp DNA PRI 31-DEC-2000  
DEFINITION Eulemur fulvus olfactory receptor (EFU145) gene, partial cds.  
ACCESSION AF179771  
KEYWORDS  
15 SOURCE Eulemur fulvus.  
ORGANISM Eulemur fulvus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.  
REFERENCE 1 (bases 1 to 485)  
20 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 485)  
25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
30 source 1..485  
/organism="Eulemur fulvus"  
/db\_xref="taxon:13515"  
gene <1..>485  
/gene="EFU145"  
35 CDS <1..>485  
/gene="EFU145"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICQPLQYSTAMSHQLCALMLAMCWLLNCPALMHTLLTRVA  
40 FCAQRAPHYCDPSALLKLACSDTRINELMIIAMGLAFLTVPLTLIVFSYVRISWAV  
LGISSPGGRCKAFSTCGSHLTVVLLFYGSLMGVYLLPPSSYSTERESRAAILYMVIIIP  
M" (SEQ ID NO:243).  
BASE COUNT 78 a 155 c 114 g 138 t  
ORIGIN  
45 1 tggccatc tgccagccac tccaaatcag cacatgtatg agtcaccagc tcgtgtcact  
61 catgtggcc atgtgtgtc tgctaaccaa ctgtcgtca ttgtatgcaca cgtgtgtgt  
121 gacccgtgtg gttttctgtg cccagaggc catccccac ttctactgtg atcccagtgc  
181 ttcctgaag ctgcctgtc cggatacccg cataaacgag ctgtatgtca tcggcatggg  
241 ctggcccttc ctacgggttc ccctcgtatc gatgtgttc tctacgtcc gcatctctg  
50 301 ggctgtgtt ggcattctgtt ctccctggagg ggcattgttcaaa gccttctcca cctgtgggtc  
361 tcatctcaag gtgggtctgc ttctctatgg gtcattatgtt ggtgtgtt tgcttcctcc  
421 gtcattttac tctacagaga gggaaaggag ggctgcccatt ctctacatgg tgatcattcc  
481 catgt (SEQ ID NO:242).

## 55 OR151

LOCUS AF179772 485 bp DNA PRI 31-DEC-2000  
 DEFINITION Eulemur fulvus EFU146 pseudogene, partial sequence.  
 ACCESSION AF179772  
 5 KEYWORDS .  
 SOURCE Eulemur fulvus.  
 ORGANISM Eulemur fulvus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
 10 REFERENCE 1 (bases 1 to 485)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE The olfactory receptor gene repertoire in primates and mouse:  
         Evidence for reduction of function in primates  
     JOURNAL Unpublished  
 15 REFERENCE 2 (bases 1 to 485)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE Direct Submission  
     JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
         1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 20 FEATURES Location/Qualifiers  
     source 1..485  
         /organism="Eulemur fulvus"  
         /db\_xref="taxon:13515"  
     gene <1..>485  
 25       /gene="EFU146"  
         /pseudo  
 BASE COUNT 98 a 145 c 110 g 132 t  
 ORIGIN  
     1 cgttgcacat tgcaagcccc tccactaccc ggtgctcatg agcagcaggg tctgcacaca  
 30     61 gctcatcc tcgcgtcgcc tggcagggtt ctccatccatc atttgtgccttg tcatccatc  
    121 cagttagttt ccatttcgtt acaccatca accacttc ttctgtactt atacaccctt  
    181 aatggagggtt gtctgcagtggccaaagggtt gctggagatgtt gggattttt ccttgcctt  
    241 gtttgcaccc ctcagcaccc ttgtgtcatg caccctgtcc tacatccaga tcatcagcac  
    301 gattgtcagg atccctctgtt tccaggagag gaaaaagggtt ttctccacctt gttccccc  
 35     361 tgtcatgtt gttaccatgtt gctatggaaa gctgtttttt tatgtatgtt aagccccc  
    421 caggcaaaagg ggttgcataa aacaaaggag tttttttttt caatacaggattt attggccccc  
    481 tcttg (SEQ ID NO:244).

## OR152

40 LOCUS AF179773 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Eulemur fulvus olfactory receptor (EFU147) gene, partial cds.  
 ACCESSION AF179773  
 KEYWORDS .  
 45 SOURCE Eulemur fulvus.  
 ORGANISM Eulemur fulvus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 487)  
 50    AUTHORS Giorgi,D.G. and Rouquier,S.P.  
   TITLE The olfactory receptor gene repertoire in primates and mouse:  
         Evidence for reduction of function in primates  
   JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 55    AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
5 source 1..487  
/organism="Eulemur fulvus"  
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gene <1..>487  
/gene="EFU147"  
10 CDS <1..>487  
/gene="EFU147"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICLPLHYTMVMKPRCCLMLVAASWLCSHCLAFSLTLLMTQFS  
15 FCASHSIQHFCDVPPLKLACSDTHIFQVTMLTEGVLSGVIPLTCVLVSYAHIMHTI  
LRIPSAGGKHKVFSTCGSHLSVTLFYGTLFLVYFQPSSSYSADTGMVACVVYTMVTP  
MV" (SEQ ID NO:246).

BASE COUNT 86 a 161 c 93 g 147 t

ORIGIN

20 1 cgtggccatc tgcccttc tgcactacac catggcatg aaaccccgat gctgcctgat  
61 gctggcga gcattctggc tctgctcca ctgcctggc ttctctctca ccctctgat  
121 gactcagttc tcattctgtt cctccattt catccaacac ttttctgtt atgtaccccc  
181 actcctcaaa ctggcctgtt cagacaccca tatcttcag gtcacaatgt taactgaagg  
241 agtccctca ggtgtatccc ctcttacccg tgcctggc tcttagcccc acatcatca  
25 301 caccatccctt aggatccctt ctgcgtgggg caagcacaaaaa gtcttctcta cctgtggc  
361 tcacctgtca gggtcactt cttctatgg gaccctttt ctgggttatt tccagccctc  
421 atcctccctac tcagcagata ctggaatgtt ggcatgtgtta gtatacacga tggcaccccc  
481 catggtg (SEQ ID NO:245).

30 **OR153**

LOCUS AF179774 487 bp DNA PRI 31-DEC-2000  
DEFINITION Eulemur fulvus olfactory receptor (EFU148) gene, partial cds.

ACCESSION AF179774

35 KEYWORDS .

SOURCE Eulemur fulvus.

ORGANISM Eulemur fulvus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.

40 REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

45 REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

50 FEATURES Location/Qualifiers

source 1..487  
/organism="Eulemur fulvus"  
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gene <1..>487  
/gene="EFU148"

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5           CDS       <1..>487  
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          FCDSDTIDHFICDASPLLNISCSNTWFMEQTVIICAVLTLIMTLCVVLSYIYIKTI  
          LGFSSAQKQKKAFSTCSSHMIVSITYGSYIFYIKPSAKEEVAINKGVTVLTSIAP  
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10          BASE COUNT   118 a   118 c   88 g   163 t  
10          ORIGIN  
          1 tgtggccatc tgcaaaccgc tgcattatgt ggccattatg agtaacacag tctgcagaag  
          61 acttgtcttt tgttgtggg tagctggct gtttattata atccctccac tttagctggg  
          121 cctaaatctg gaattttgtg attctgatac cattgatcat ttatctgtg atgecatctcc  
          181 cctccitgaat atctctgtt caaatacttg gtcatggaa cagactgtta tcatactgtc  
15          241 agtgttgcacc ctcaattatga cactttagtg ttagtgcctg tccttacattt atatcatcaa  
          301 gacaattttt ggatttcctt ctgcccagca aaagaaaaaa gcctttcca cctgttetc  
          361 ccacatgatt gtgggttcca tcacatatgg cagctacatc ttcatctata tcaaaccctc  
          421 tgcaaaggaa gaatgttcca ttaacaaggg ttttttttttgcacttccatccatcgcccc  
          481 catgtt (SEQ ID NO:247).  
20

#### OR154

LOCUS AF179775 487 bp DNA PRI 31-DEC-2000  
DEFINITION Eulemur fulvus olfactory receptor (EFU149) gene, partial cds.  
25          ACCESSION AF179775  
KEYWORDS  
SOURCE Eulemur fulvus.  
ORGANISM Eulemur fulvus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
30          Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
35          JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
40          1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
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          /db\_xref="taxon:13515"  
45          gene     <1..>487  
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50          /product="olfactory receptor"  
          /translation="VAICKPLHYRVIMNRRVCTLLVFASWLVSFLIVFPALMLLKLD  
          YCGFNIIDHFTCDYFPLLQLSCSDTKLEIMGFSCAVFTLMFTLALIFLSYMHIVRTI  
          LRIPSTSQRKAFSTCSSHMIVVISISYGSCIFMYIKPSAKDRVSLSKAVAVLITSVAP  
          ML" (SEQ ID NO:250).  
55          BASE COUNT   109 a   113 c   91 g   174 t

**ORIGIN**

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61 gtcgtctt gcctctggc tggtttatt ctaatcgta ttccagcac tcatgttgct  
121 cttaaagttt gattactgtg gatttaatat tattgaccat ttacctgtg attattttcc  
5 181 cctgtcgac ctccctgtt cagataaaaa attcctggag ataatgggg tttcctgtgc  
241 tggtttact ctaatgtca ctggcatt aatattctg tcctacatgc acatcgtag  
301 aacgatTTT agaaTCCTT ctactagtca gaggacaag gcctttcta catgtcttc  
361 ccacatgatt gtcatctca tctttatgg cagctgcatt ttatgtaca ttaagccctc  
421 agcaaaggat agagtatct tgagcaaggc agtggctgtg ctaatcacct cagtagctcc  
10 481 catgtc (SEQ ID NO:249).

**OR155**

LOCUS AF179776 484 bp DNA PRI 31-DEC-2000  
15 DEFINITION Eulemur fulvus EFU150 pseudogene, partial sequence.  
ACCESSION AF179776  
KEYWORDS  
SOURCE Eulemur fulvus.  
ORGANISM Eulemur fulvus  
20 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
REFERENCE 1 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
25 Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
30 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
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35 /db\_xref="taxon:13515"  
gene <1..>484  
/gene="EFU150"  
/pseudo  
BASE COUNT 80 a 157 c 112 g 135 t  
40 ORIGIN  
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61 gctggcctg ggctcctggc tctgtggtt cctggcatt gcagtgcata cgcccttat  
121 cagtgccctg tccttcgtg ggcggcgtgc catcaatcac ttcttcgtg acattgcacc  
181 ctggatcgcc ctggcgtta ccagcacaca ggcaatagag ctgcgtggct ttgtgattgc  
45 241 ttgtggtc atccgttgtt catgcctcat cacccgttc tccatgtt acattatcg  
301 caccatccat aggtcccat ctgccagcgg cggagcaag ccttcctac gtgcctct  
361 cacatcaccg tggcgtcat ctggatggg tccacgatt ttcttcgtt ccgcaccc  
421 atcacagacg cttggatct gacaaaggt gtccatgtcc tgaacaccgt ggtgactcca  
481 gttc (SEQ ID NO:251).

**OR156**

LOCUS AF179777 487 bp DNA PRI 31-DEC-2000  
55 DEFINITION Eulemur fulvus olfactory receptor (EFU151) gene, partial cds.  
ACCESSION AF179777

KEYWORDS .

SOURCE Eulemur fulvus.

ORGANISM Eulemur fulvus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
5 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

10 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
15 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

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/gene="EFU151"

CDS <1..>487

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25 /product="olfactory receptor"

/translation="LAICYPLHYRTIMSSLATQLALGSWVCGLAIAVLATALISGLS

FCGARAINHFFCDIAPWIALACTSTQAIELVAFVIAFVVILSSCLITLVSYVYIISTI

LRIPSASGRSKAFSTCSSHLTVVLIWYGSTIFLHVRTSITDALDLTKAVHVLNTVVTP  
VL" (SEQ ID NO:253).

30 BASE COUNT 83 a 159 c 110 g 135 t

ORIGIN

1 tctggctatc tgctatcc tcacactacag gacaatcatg agcagccgtc tggctacaca

61 gctggcccttgg ggetcttggg tctgtggttt cctggccattt gcagtgcata cggcccttat

121 cagttggcttg tccctctgtg ggcggccgtgc catcaaccac ttcttctgtg acattgcacc

35 181 ctggattgtcc ctggcctgtca ccagcacaca ggcaatagag ctcggtggcc ttgtgattgc

241 ttgtgtggtc atccctgagtt catgcctcat caccctggtc ttcttgcgtgtt acattatcag

301 caccatcttc agggatccat ctggcagcgg cgggagcaaa gccttctcta cgtgctcctc

361 tcacaccttacc gtgggtgtca tctggatgg gtccacgatt ttcttcatg tccgcaccc

421 catcacagac gccttggatc tgaccaaaggc tgcgtatgtc ctgaacaccg tggtgactcc

481 agttctta (SEQ ID NO:252).

**OR157**

LOCUS AF179778 487 bp DNA PRI 31-DEC-2000

45 DEFINITION Eulemur fulvus olfactory receptor (EFU153) gene, partial cds.

ACCESSION AF179778

KEYWORDS .

SOURCE Eulemur fulvus.

ORGANISM Eulemur fulvus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

55 Evidence for reduction of function in primates

JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 5 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
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     CDS <1..>487  
         /gene="EFU153"  
 15     /codon\_start=2  
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         /translation="VAICKPLHYRVIMNRRVCTLLVFASWLVSLIVFPALMLLKLD  
           YCGFNIIDHFTCDYFPLLQLSCSDTKFLEIMGFSACVFTLMFTLALIFLSYMHIVRTI  
           LRIPSTSQRKAFSTCSSHMIVISISYGSCIFMYIKPSAKDRVSLSKAVAVLITSVAP  
 20     ML" (SEQ ID NO:255).  
 BASE COUNT 109 a 113 c 91 g 174 t  
 ORIGIN  
     1 ttttgctatc tgtaagcccc tgcattacag ggtcatcatg aatcgaaagag tctgcacact  
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 25     121 cttaaaggctt gattactgtg gatattaat tatgaccat ttacatgtg attattttcc  
     181 cctgtcgag ctttcgtgtt cagataaaaa atccctggag ataatgggggt ttccctgtgc  
     241 tggtttact ctaatgtca ctttgcatt aatatttctg tcctacatgc acatcgtgag  
     301 gacgattttg agaattccctt ctactagtca gaggacaag gccctttcta catgtcttc  
     361 ccacatgatt gtcatctcca tctcttatgg cagctgcatt ttatgtaca ttaageccctc  
 30     421 agcaaaaatg agatgtatctt tgagcaaggc agtggctgtg ctaatcacct cagtagctcc  
     481 catgctc (SEQ ID NO:254).

### OR158

35 LOCUS AF179779 488 bp DNA PRI 31-DEC-2000  
 DEFINITION Eulemur fulvus olfactory receptor (EFU154) gene, partial cds.  
 ACCESSION AF179779  
 KEYWORDS .  
 SOURCE Eulemur fulvus.  
 40 ORGANISM Eulemur fulvus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 488)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 45 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 488)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 50 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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         /organism="Eulemur fulvus"

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 gene <1..>488  
 CDS /gene="EFU154"  
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 /product="olfactory receptor"  
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 YCRSREIHHSFCEVPAAVTLSCSDTSLYEMLMYLCCVLMILLIPVTVISSSYSFILLTI  
 10 HRMGSAEGRKKAFATCSSHMTVVILFYGAAIYTMLPSSYHTPEKDMMVSVFYTILTP  
 VL" (SEQ ID NO:257).  
 BASE COUNT 92 a 163 c 95 g 138 t  
 ORIGIN  
 15 1 catggccatc tgccatccgc tccgttaccc tgcgttcatg aaccacaggg tggctcttt  
 61 cctggcatct ggctgttgtt tcctgggatc agtagatggc ttcaatgcata ctccaaatcac  
 121 catgaccatcc ccctactgcg ggtccggga gattcaccat tccttctgcg aagtccctgc  
 181 tggtaacgacg ctttctgtt cagacaccc actctatgaa atgctcatgtt acctgtgtctg  
 241 tgcctcatcg tcctcatcc ctgtgacagt catttcaagg tcctattcat tcatttcct  
 301 caccatccac aggatgggct cagcagaggg ccggaagaag gcctttgcca cctgtccct  
 361 ccacatgacc gtggtttatcc tcctctatgg ggccggccatc tacacccata tgctccccag  
 421 tccttaccc actccctgaga aggacatgtt ggtgtctgtt ttttatacca tcctaactcc  
 481 tggctaa (SEQ ID NO:256).

### OR159

25 LOCUS AF179780 488 bp DNA PRI 31-DEC-2000  
 DEFINITION Eulemur fulvus EFU155 pseudogene, partial sequence.  
 ACCESSION AF179780  
 KEYWORDS  
 30 SOURCE Eulemur fulvus.  
 ORGANISM Eulemur fulvus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 488)  
 35 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 488)  
 40 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
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 gene <1..>488  
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 BASE COUNT 111 a 113 c 91 g 173 t  
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 61 tgctcgatctt tgcctctgg ctggttcat tcataatcgat attcccgaca ctcatgttgc  
 55 121 tcttaaagct tgattactgt ggatttaata ttattgacca ttatcacatgtt gattatttc

181 ccctgctca gcttccgt tcagatacaa aattcctgga gataatgggg tttcctgt  
241 ctgtgttac tctaattgttc actttggcat taatatttgc gtcctacatg cacatcgta  
301 gaacgatTTT gagaattcct tctactatgc agaggacaaa ggcctttct acatgttctt  
361 cccacatgtat tgcatatcc atctcttatg gcagctgcat tttatgtac attaaggcct  
5 421 cagcaaaggaa tagagtatct tttagcaagg cagtggctgt gctaattacc tcagtagctc  
481 ccatgcac (SEQ ID NO:258).

## OR160

10 LOCUS AF179781 486 bp DNA PRI 31-DEC-2000  
DEFINITION Eulemur fulvus EFU156 pseudogene, partial sequence.  
ACCESSION AF179781  
KEYWORDS  
SOURCE Eulemur fulvus.  
15 ORGANISM Eulemur fulvus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.  
REFERENCE 1 (bases 1 to 486)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
20 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 486)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
25 TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
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/pseudo  
35 BASE COUNT 119 a 110 c 93 g 164 t  
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121 tttaaatcta aaattctgtg actctaataat gatgtatcat ttgggtgcg atgcattcc  
40 181 cctggtaaaa atctcatgtc cagacacatg gttcatggaa cagacggta tcatctgtc  
241 tgtgtgttgc accatgtatgc ctctaaatgt tgtagtctg tcatacgctt acatcatcaa  
301 gacaatttt agatccctt ctgtccagca aaggaaaaag gcctttcca cctgttctc  
361 ccacatgtat gtggttcca tcacatgttgg cacgtgcatt tcatactaca tgaatcctac  
421 acgaaaggaa gaagtgtaccg ttaataaagt agtttcttgc ctcattttctt ctatgttgc  
45 481 acatttg (SEQ ID NO:259).

## OR161

LOCUS AF179782 486 bp DNA PRI 31-DEC-2000  
50 DEFINITION Eulemur rubriventer ERU157 pseudogene, partial sequence.  
ACCESSION AF179782  
KEYWORDS  
SOURCE Eulemur rubriventer.  
ORGANISM Eulemur rubriventer  
55 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
REFERENCE 1 (bases 1 to 486)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
5 Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 486)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
10 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
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15 /db\_xref="taxon:34829"  
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BASE COUNT 78 a 157 c 112 g 139 t  
20 ORIGIN  
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121 gacccgtgtg gttttctgtg cccagaaggc catccccccat ttctactgtg atcccagtgc  
181 ttccttgaaat ctcgcctgcg cggataccgg cataaatggat ctgatgtca tcgcatggg  
25 241 cttagcgttc ctcaatttc ccctcacact gatcgcttc tcttacgtcc gcatctctg  
301 ggctgtgtt ggcatctcgat ttccctgggg gggatcaag ggcttcata cctgtgggtc  
361 tcatctcacg gtgggtctgc ttcttatgg gtctttatg ggtgtgtatt tgcttcctcc  
421 gtcatcttac tctacagaga gggaaaggcag gctgccatcc tctacatggt gatcattccc  
481 atgtta (SEQ ID NO:260).

30

## OR162

LOCUS AF179783 484 bp DNA PRI 31-DEC-2000  
DEFINITION Eulemur rubriventer ERU159 pseudogene, partial sequence.  
35 ACCESSION AF179783  
KEYWORDS  
SOURCE Eulemur rubriventer.  
ORGANISM Eulemur rubriventer  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
40 Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.  
REFERENCE 1 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
45 JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 484)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
50 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
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/db\_xref="taxon:34829"  
55 gene <1..>484

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/gene="ERU159"
/pseudo
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      61 aatggctgca tggcttgga tcataggcta tctgatctcc ttatgtcaaa cagtcattgcac
     121 aatgtatattgc ctttctgtg gcaataatgtt cattgtatcat attaccgttg agatcctggc
     181 tctttaaactc atatgtcttag atatgtccat gaatgtgcctt atcatggcag tggcaatgt
     241 tgttatattgtgtgattccctc tgctgtcat ttttatctcc tatgtatccat ccctcttc
     301 catcctgaga attaattttctt ctggggggag aaagaagcc ttgcacacctt gttcagcccc
     361 cctgactgtgtcgtatcttataatgttgcactgtctt acgtatcatgtatccatgtc
     421 aaagtacaca aaagtatctgtatggatcat tgcaactgtctt tacggagtag taaccccaat
     481 gtgt (SEQ ID NO:261).

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15 OR163

**Locus** AF179784 487 bp DNA **PRI** 31-DEC-2000  
**Definition** Eulemur rubriventer olfactory receptor (ERU160) gene, partial cds.  
**Accession** AF179784  
**Keywords**  
**Source** Eulemur rubriventer.  
**Organism** Eulemur rubriventer  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.  
**Reference** 1 (bases 1 to 487)  
**Authors** Giorgi,D.G. and Rouquier,S.P.  
**Title** The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
**Journal** Unpublished  
**Reference** 2 (bases 1 to 487)  
**Authors** Giorgi,D.G. and Rouquier,S.P.  
**Title** Direct Submission  
**Journal** Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UP  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
**Features** Location/Qualifiers  
source 1..487  
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CDS <1..>487  
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/product="olfactory receptor"  
/translation="VAICHPLHYTTIMREELCTLVAISWLSCASSLSHT  
FCAANVIPNFFCDLAALLKLSCSDFLNEVMFTVGVVVITLPFLC  
LRVPSTKGICKALSTCGSHLSVVSLYYGAIFGQYLFPALSNSIDKE  
ML" (SEQ ID NO:263).  
**Base Count** 91 a 143 c 104 g 149 t  
**Origin**  
1 tgtggccata tgtcacccctc tccactacac caccatcatg agggaaagage tctgcaccc  
61 attgggtggct atatcttggc tccttgtctg tgccagctcc ctctccaca cccttcctc  
121 gacccggctg tccttctgtg ctgctaattgt catccccaaac ttcttgttg accttgc  
181 tctgctcaag ctgtccctgtc cagacatctt cctcaatggag ctggtcatgt ttacagttag  
241 gtgggtggc attaccattgc cattctttagt tatcttgtta tcctacggct acatggggc

301 caccatcccg agggccctt caaccaaagg gatgcggaa gcattatcca cgttgtggtc  
361 ccatctctt gtgggtctc tgtactacgg gcaatattt gggcagtacc ttcccagc  
421 attaagcaat tccatggaca aggacatcat tggctatg atgtacacgg tggcacacc  
481 catgtt (SEQ ID NO:262).

5

OR164

LOCUS AF179785 475 bp DNA PRI 31-DEC-2000  
DEFINITION Eulemur rubriventer olfactory receptor (ERU161) gene, partial cds.

10 ACCESSION AF179785

## KEYWORDS

SOURCE Eulemur rubriventer.

## ORGANISM *Eulemur rubriventer*

15 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia; Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.

## REFERENCE 1 (bases 1 to 475)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

AUTHORS Giorgi,D.G. and Rouquier,S.I.  
TITLE The olfactory receptor gene repertoire in primates

**TITLE** The olfactory receptor gene repertoire in primates and mouse  
Evidence for reduction of function in primates  
**JOURNAL** Unpublished  
**REFERENCE** 2 (bases 1 to 475)  
**AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
**TITLE** Direct Submission  
**JOURNAL** Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
**FEATURES** Location/Qualifiers  
source 1..475  
/organism="Eulemur rubriventer"  
/db\_xref="taxon:34829"  
gene <1..>475  
/gene="ERU161"  
CDS <1..>475  
/gene="ERU161"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICKPLHYMNIMSRQLCHLLVAGSWLGGFLHSIIQIFITIQSP  
FCGPNVIDHYFC DLLPLFKLACTDTFVEGLTVLANSGLIPVCSLFILVSSYIILVHL  
RKHSAEGRHKAI STCASHITV VII FEGPAI FLYMRPSSTTEDKL MGVL YTVITPS" (SEQ ID

NO.265)

40 BASE COUNT 92 a 133 c 97 g 153 t

## BRIDE OF ORIGIN

1 cgtggcaatc tgcaaggctc ttcatattacat gaatattata agtcgtcaac tttgttcacct

61 tctggtagct ggttccctggc tgggaggctt tcattcaatctt attattcaga tttttatcac

121 catccaaatcg cccttttgtc gtcccaacgt gattgaccac tacttctgtc accttcctgcc

181 attattcaag cttgcctgca ccggacaccctt ttagaggggg ctgactgtgt tgccaaatgg

241 tggcttaatt cccgtgtct ccctgtttat cctggtgtcc tcctatatca ttattcttgt

301 gcacttggagg aaacattctg cagagggggag gcacaaaagcc ctctctacct gtgcctc

361 catcacggtg gtcatttgt ttttggacc tgccatcttc ctctacatgc gaccttcctc

421 tacccatcaca gaagacaaac tcatgggtgt ttgttacaca gtcatcaccc ccagt

50 721 lacustris gaugleratus tea-ssss-s. g. glauculus glauculus strig. (SISQ ID NC-207).

OKI63

DEFINITION *Eulemur rubriventer* olfactory receptor (ERJ116?) gene, partial sequence.

**DEFINITION** Estuinal Tubercoletta olfactory receptor (EROT02) gene, partial cds.  
**ACCESSION** AE179786

55 ACCESSION #179786

KEYWORDS .

SOURCE Eulemur rubriventer.

ORGANISM Eulemur rubriventer

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

5 REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

10 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

15 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Eulemur rubriventer"

/db\_xref="taxon:34829"

20 gene <1..>487

/gene="ERU162"

CDS <1..>487

/gene="ERU162"

/codon\_start=2

25 /product="olfactory receptor"

/translation="VAISNPLLYVQAMPRKLCICFIICSYTGGFVNIAILTSNTFTLD

FCGDNVIDDFCDVPPLVKLACDVEGSYQAFLASNVISPAMLILASYVFIIAV

LVRRSSRGRLKAFSTCSSHLISVTLYGSILYIYSRPSSSYSLERDKMVSTFYTVLFP

TL" (SEQ ID NO:267).

30 BASE COUNT 91 a 158 c 98 g 140 t

ORIGIN

1 tgtggccatc tccaaccccc cgctctatgt tcagggccatg ccaaggaaac tgtgcacatcg

61 ttccatttac ttttcataca ctggagggtt tgtaatgcataatattaa ccagcaacac

121 attcacgttg gatttttgttg gtgacaatgt catcgacgac ttttctgttg atgtccacc

181 cctggtaag ttggccgttg atgtggaaagg gagcttccagg gctgtgtgtt acttccctt

241 ggccctccaaat gtcatctccc cggccatgtt catcctcgcc tccatgtt tcatcatcgcc

301 agcagtcttg agggcccggtt ccageccgggg cccgcctaag gccttctcca cttgtgtccctc

361 ccacctgtatc tctgttacctatactacgg ctccatttcc tacatctact ctgcgttccag

421 ttccagctatccctcgaga gggacaaaat ggtcttacc ttatcacccg tgctgttccc

481 cacgctc (SEQ ID NO:266).

**OR166**

LOCUS AF179787 478 bp DNA PRI 31-DEC-2000

45 DEFINITION Eulemur rubriventer olfactory receptor (ERU163) gene, partial cds.

ACCESSION AF179787

KEYWORDS .

SOURCE Eulemur rubriventer.

ORGANISM Eulemur rubriventer

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Strepsirhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 478)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

55 Evidence for reduction of function in primates

JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 478)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 5 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..478  
         /organism="Eulemur rubriventer"  
 10     /db\_xref="taxon:34829"  
     gene <1..>478  
         /gene="ERU163"  
     CDS <1..>478  
         /gene="ERU163"  
 15     /codon\_start=2  
         /product="olfactory receptor"  
         /translation="VAVCNPLHYLTVMNRQLCLQLVFACWCGGFIHSVTQVILVIQLP  
             FCGPNKLDASFYCDVPEVIKACLDTYVVEVLMTNSGLLSLVCFLVLIFSYATILTTL  
             RTRLHQGQSKAFSTCASHLMVVSLIFVPCVFIYLRFCSFSVDKIFSVFYMVITPML" (SEQ ID  
 20 NO:269).  
 BASE COUNT 85 a 132 c 108 g 153 t  
 ORIGIN  
     1 tgttgcccta tgtaaccctt tgccattacccatg gacgggtcatg aaccggccagg ttgccttca  
     61 gtgggtttt gcctgctgggt gtgggggtt catccactct gtcacacagg ttatactgggt  
 25     121 catccagctg cccttctgtg gccccaaacaa atggacagt ttctactgtg atgtcccaga  
     181 ggtcatcaag ctggcctgcc tggacaccta tggttagaa gtgtatgg ttaccaacag  
     241 tggctgtcta tcttttgctt ctgtatattc ttctatgcca ccatctgac  
     301 caccctgaga actcgccctcc accaggccca gagcaaggcc ttctctactt gtgcctccca  
     361 cctaattgggt gtcagcctga tctttgtgcc atgtgtatcc atctacttga ggccttctg  
 30     421 cagcttctt gtggataaga tattctctgt tttttacatg gtgtatcacac ctatgtt (SEQ ID NO:268).

## OR167

LOCUS AF179788 487 bp DNA PRI 31-DEC-2000  
 35 DEFINITION Eulemur rubriventer olfactory receptor (ERU164) gene, partial cds.  
 ACCESSION AF179788  
 KEYWORDS  
 SOURCE Eulemur rubriventer.  
 ORGANISM Eulemur rubriventer  
 40     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
       Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 45     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 50 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..487  
         /organism="Eulemur rubriventer"  
 55     /db\_xref="taxon:34829"

gene <1..>487  
   /gene="ERU164"  
 CDS <1..>487  
   /gene="ERU164"  
   5 /codon\_start=2  
   /product="olfactory receptor"  
   /translation="VAICKPLHYTTIISTRVCILLVCSSWLAGFLIIFPPIILLLQLD  
   FCASNIIIDHFICDSSPILQLSCTNTFLEMAFCLAVVTLMVTLVILSYTNIIRTI  
   LRIPSMSQRKKAFTSCSHIIVVSLSYGSCIFMYIKPSTRERVTLSKGVVNTSVAP  
   10 LL" (SEQ ID NO:271).  
 BASE COUNT 116 a 116 c 79 g 176 t  
 ORIGIN  
   1 tggccatc tgaaaccc ttcatcac aaccatatt agcaccaggg ttgttatcc  
   61 ctctgttgtt agtcctggc ttgcaggatt ctgtatcatc ttccaccaa taatccct  
   15 121 tctgcagttt gacttcgttg cctccaatata aatgtatcatc ttatctgtt atcttc  
   181 aatctgcag cttcttgtt caaacactca cttctgtt aatgtatcatc ttgttttagc  
   241 cgtggtaaca ctatggtaa ccttgaccc ttgttatttc ttctatcaa atattatccg  
   301 gacaattcta agaattccctt ctatggatca aaggaaaaaa gcctttcca ctgttc  
   361 ccatataata ttgtttccc tctttatgg tagttgtatc ttcatgtaca taaaggcc  
   20 421 tacaaggaaa agggtgactt taagcaagg agtagtgc ttataactt cagtggctcc  
   481 tctttt (SEQ ID NO:270).

## OR168

25 LOCUS AF179789 483 bp DNA PRI 31-DEC-2000  
 DEFINITION Eulemur rubriventer ERU165 pseudogene, partial sequence.  
 ACCESSION AF179789  
 KEYWORDS .  
 SOURCE Eulemur rubriventer.  
 30 ORGANISM Eulemur rubriventer  
   Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
   Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.  
 REFERENCE 1 (bases 1 to 483)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 35 TITLE The olfactory receptor gene repertoire in primates and mouse:  
   Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 483)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 40 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
   1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
   source 1..483  
   45       /organism="Eulemur rubriventer"  
      /db\_xref="taxon:34829"  
   gene <1..>483  
      /gene="ERU165"  
      /pseudo  
 50 BASE COUNT 98 a 144 c 108 g 133 t  
 ORIGIN  
   1 cggtgccatc tgaaaggcccc tccactaccc ccgtgctcat gagcaggcagg gtctgcacac  
   61 agctcatctt cgcctgtgg ctggcagggt tctccatcattgtgcctt gtcatttc  
   121 ccagtcaatgtt tccattctgtt gacacccaca tcaaccacctt cttctgtgac tatacaccc  
   55 181 taatggagggtt ggtctgcagggtt gggccaaagg tgctggatgtt accctggcc

241 tggtggcact gtcagcacc ttggtgctga tcacccgtc ctacatccag atcatcgaga  
301 cgattgtcgatccccctgtccaggaga ggaaaaaggc ttctccacc tggccccc  
361 atgcacatgtttttatgtatgtc aagccccc  
421 caggcaagg ggttgatcta aacaaaggag tgtcttaatc aataacaatta ttgccccct  
481 ctt (SEQ ID NO:272).

5

## OR169

LOCUS AF179790 486 bp DNA PRI 31-DEC-2000

10 DEFINITION Eulemur rubriventer olfactory receptor (ERU167) gene, partial cds.

ACCESSION AF179790

KEYWORDS .

SOURCE Eulemur rubriventer.

ORGANISM Eulemur rubriventer

15 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.

REFERENCE 1 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

20 Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

25 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..486

/organism="Eulemur rubriventer"

30 /db\_xref="taxon:34829"

gene <1..>486

/gene="ERU167"

CDS <1..>486

/gene="ERU167"

35 /codon\_start=2

/product="olfactory receptor"

/translation="VAICHPLRYTDIMTPRLCGLLVSLSLICSADALLHSLMLLQLS

FCTDLEISLFFCEVVQVVKLACSDTLVNNLLIYFAACTLGGIPLSGIIFSYTQIATSI

LKMPSSGRKYKAFSTCGSHLSVVSFYGTGLGVYISSAVSDSSRTAVASVMYTVVTP

40 C" (SEQ ID NO:274).

BASE COUNT 83 a 139 c 107 g 157 t

ORIGIN

1 tgggccatc tgccacctc tgagatacac agacatcatg actccgtc tgggtgtct

61 gctggttca cttccctgt ccatttgcgc cgccggatgcc ctgtccaca gcctcatgt

45 121 gctcagctg tccctctgca cagacccttga aatctccat tttctctgtt aagtctgtca

181 ggtcgtaag ctcgcgtgtcccgataccct cgtcaacaac cttctgtatcttgcac

241 ttgcacccgttggcatttcctctgttgcatcttttcttacactt aaatagccac

301 ctccatccatggaaaatgccgt catcgccgttggcatttgcac

361 tcacccgtca gttgttcccccttgcatgttgcacgggttgcata tcagttctgc

50 421 agtttctgac tcttcaaggttggactgcgttgcgttgcata tcagttctgc

481 ctgttg (SEQ ID NO:273).

## OR170

55 LOCUS AF179791 487 bp DNA PRI 31-DEC-2000

DEFINITION Eulemur rubriventer olfactory receptor (ERU168) gene, partial cds.  
ACCESSION AF179791  
KEYWORDS  
5 SOURCE Eulemur rubriventer.  
ORGANISM Eulemur rubriventer  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Strepsirrhini; Lemuridae; Eulemur.  
REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
10 TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
15 TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..487  
20 /organism="Eulemur rubriventer"  
/db\_xref="taxon:34829"  
gene <1..>487  
/gene="ERU168"  
CDS <1..>487  
25 /gene="ERU168"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VAICHPLTYTDIMTPRLCGLLVSLSLICSADALLHSLMLLQLS  
FCTDLEISLFFCEVVQVVKLACSDTLVNNLLIYFAACTLGGIPLSGIIFSYTQIATSI  
30 LKMPSSGRKYKAFA SACGSHLSVVSFYGTGLGVYISSA VSDSSRTAVASV MYTVVTP  
VL" (SEQ ID NO:276).  
BASE COUNT 82 a 140 c 108 g 157 t  
ORIGIN  
35 1 tgtggccatc tgicacccctc tgacatacac agacatcatg actcctcg tc ttgtggct  
61 gctggttca ct tccctgt ccatttgc tc cgccggatgcc ct gctccaca gcctcatgt  
121 gctcagctg tc tctctgca cagaccttga aatctccctt ttcttctgtg aagtcttca  
181 ggtcgtaag ctgcgtgtc ccgataccctt cgtcaacaac ct tctgtatctt atttgcage  
241 ttgcacccctt ggtggccattc ctctgtctgg catcattttt tcttacttc aaataggccac  
301 ctccatttt taaaatggccgt catcggccag aaagtataaa gctttccg cctgtgggtc  
40 361 tcacctgtca gtgtttccc ttttctatgg gacagggttgggggttaca tca gtttctgc  
421 agtttctgac tttcaagga ggactgcgtt ggcttcagt atgtacactg tggcactcc  
481 cgttgtt (SEQ ID NO:275).

## OR171

45 LOCUS AF179792 486 bp DNA PRI 31-DEC-2000  
DEFINITION Macaca sylvanus olfactory receptor (MSY172) gene, partial cds.  
ACCESSION AF179792  
KEYWORDS  
50 SOURCE Barbary ape.  
ORGANISM Macaca sylvanus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Macaca.  
55 REFERENCE 1 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 5 REFERENCE 2 (bases 1 to 486)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE Direct Submission  
     JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
         1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 10 FEATURES Location/Qualifiers  
     source 1..486  
         /organism="Macaca sylvanus"  
         /db\_xref="taxon:9546"  
     gene <1..>486  
 15       /gene="MSY172"  
     CDS <1..>486  
         /gene="MSY172"  
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 20       /translation="PAICQPLRYRVLMNHRLCVLLVGAAWVLCLLKSVTETVIAMRLP  
         FCGHHVVSHFTCEILAVLKLCGNTSVSEVFLLVGSILLPVPLAFICLSYLLILATI  
         LRVPSAAGCRKAFSTCSAHLAVVLLFYSTIIFTYMKPKSKEAHISDEVFTVLYAMVTP  
         ML" (SEQ ID NO:278).  
 BASE COUNT 79 a 163 c 125 g 119 t  
 25 ORIGIN  
     1 cctgccccatc gccagccact caggtaaccgc gtgctcatga accacggct ctgtgtgctg  
     61 ctgggtggag ctgcctgggt cctctgcctc ctcaagtgg tgactgagac agtcattgcc  
     121 atgaggctgc ccttctgtgg ccaccacgtg gtcagtcaact tcacctgaga gatcctggcg  
     181 gtgctgaagc tgacgtgcggg taacacatcg gtcagcgggg tttccctgct ggtgggctcc  
 30     241 atccctgcctgc tgccctgtgcc cctggccatttgcctgtg ctacttgcct catccctggcc  
     301 accatcccta gggtgccctc agctgctggg tgccgcggaaag ccttctccac ctgctcagca  
     361 cacctggctg tggtgctgct ttctcacagc accatcatct tcacgtacat gaagcccaag  
     421 agcaaggaaag cccacatctc tgatgaggc ttcacagtc ttcacatccat ggtcacaccc  
     481 atgttg (SEQ ID NO:277).  
 35

### OR172

LOCUS AF179793 489 bp DNA PRI 31-DEC-2000  
 DEFINITION Macaca sylvanus MSY173 pseudogene, partial sequence.  
 40 ACCESSION AF179793  
 KEYWORDS  
 SOURCE Barbary ape.  
 ORGANISM Macaca sylvanus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 45     Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
     Macaca.  
 REFERENCE 1 (bases 1 to 489)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE The olfactory receptor gene repertoire in primates and mouse:  
 50     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 489)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE Direct Submission  
 55     JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..489  
   /organism="Macaca sylvanus"  
 5     /db\_xref="taxon:9546"  
 gene   <1..>489  
   /gene="MSY173"  
   /pseudo

BASE COUNT 95 a 120 c 104 g 170 t

10 ORIGIN

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 1 cgtagccatc tgtaacccac tggcacac ggtcaccatg tctccccaga tgggttgc
 61 cttttgtcg ggtgtctatg ggatgggggt ttggggct gtgactcata tggaaacat
 121 aacgtttatg ccctttgtg gagacaacct tgtcaatcac tacatgtgtg acctccccc
 181 ttccttgag ctctctgca acagcactt cataaatttgc tgggtgggtt ttattattgt
 15 241 gaccaatggc attgggggtcg caattgtcac cattttatc tcattatgggtt ttatcttc
 301 cagcattctc cacattagct ccacagaggc cagggtctaa gcctcagta cctgeagttc
 361 cacataattg tggtatcgct gttctttggg tcagggtgctt tcatgtaccc cacaccac
 421 tctatgtac ccctggcca ggggaacgtg tcctccattt ttataactgc tggatgc
 481 atgttagatt (SEQ ID NO:279).

```

20

**OR173**

LOCUS AF179794 481 bp DNA PRI 31-DEC-2000

DEFINITION Macaca sylvanus olfactory receptor (MSY174) gene, partial cds.

25 ACCESSION AF179794

KEYWORDS

SOURCE Barbary ape.

ORGANISM Macaca sylvanus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

30 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;

Macaca.

REFERENCE 1 (bases 1 to 481)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

35 Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 481)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

40 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
   1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

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   FCGPNVIDHFMCDLVPLLEACTDTHTLGPLIAANSGSLCFLIFSMVLASYVIILCSL  
   RTHISEGRHKVLSSCTSHIFVVILFFVPCSYLYLRPLTSFFPTDKAVTVFCTLFTPML" (SEQ ID

50  
 55 NO:281).

OR174

15 LOCUS AF179795 402 bp DNA PRI 31-DEC-2000  
 DEFINITION Macaca sylvanus MSY175 pseudogene, partial sequence.  
 ACCESSION AF179795  
 KEYWORDS .  
 SOURCE Barbary ape.  
 20 ORGANISM Macaca sylvanus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
     Macaca.  
 REFERENCE 1 (bases 1 to 402)  
 25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 402)  
 30 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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 40 BASE COUNT 89 a 105 c 77 g 131 t  
 ORIGIN  
     1 tgtggccatc tgtaagcccc tgcattacac caccatcatg agcagcaaaa tctgcattca  
     61 gcttgtctt gggtgtttgc ttgcgtggtt ctgcgtcacct ttccaccact cctcttaggc  
     121 ctaaatcttg acttctgtgc ctgcctccaa cgtcattaaat catttctact gtgcacactac  
     181 tccactcccg cagatttcgt gcactgacac acagctctgg gacaggatgg gattcatttc  
     241 agcatgggt acactcttag tcacatgtgtt aatgggtatggt gtatcatgtat atccctttct  
     301 tatggcagggtt gcatcttcat gtatgttaag ccatgggtca aacaaaagat atattttca  
     361 aagggaattt tggtgtctaa cacctctgtc gtttccacttt tg (SEQ ID NO:282).

OP135

55 LOCUS AF179796 487 bp DNA PRI 31-DEC-2000  
DEFINITION *Macaca sylvanus* olfactory receptor (MSY176) gene, partial cds.  
ACCESSION AF179796

KEYWORDS

SOURCE Barbary ape.

ORGANISM Macaca sylvanus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
5 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Macaca.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
10 Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission  
15 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Macaca sylvanus"

20 /db\_xref="taxon:9546"

gene <1..>487

/gene="MSY176"

CDS <1..>487

/gene="MSY176"

25 /codon\_start=2

/product="olfactory receptor"

/translation="VAICNPLLYALVVSPKVCRLLVSLTYLQLSLITALTVSSCVFSVS

YCSSNIINHFYCDDVPLLALSCSDTYIPETAVIFSGTNLFFSMTVVLISYFNIVITI

30 LRIRSSEGRQKAFSTCASHMIAVVVFYGTLLFMYLQPRSNHSLTDKMASVFYTLIIP  
ML" (SEQ ID NO:284).

BASE COUNT 104 a 123 c 87 g 173 t

ORIGIN

1 cgtggctatt tgcaaccctc tgctctacgc attagtggtg tctccaaagg tatgtcgct

61 gctgggtgtcc ctcacatacc ttcaaggtct tatcacagcc cttaactgtct ctccctgtgt

35 121 gtctctgtg tcatactgtt ctccaacat catcaaccat ttttactgtg acgatgtccc

181 ttggcttagca ttgcgttgtt ctgataccta cattccagaa acagcagtgt ttatctttc

241 agggaccaat ttgtttctt ccatgaccgt tttctgtata tcctacttca acattgttat

301 taccattttg aggatacgtt cctcagaagg acgacaaaaaa gcctttcca cggtgtcttc

361 tcacatgata gctgtggttg tttctatgg gactctccctt ttcatgtatt tgcaaccaaag

40 421 gagtaatcac tcattagata ctgacaaaaat ggcctcggtc ttctacaccc tgatcatacc

481 tatgttg (SEQ ID NO:283).

**OR176**

45 LOCUS AF179797 487 bp DNA PRI 31-DEC-2000

DEFINITION Macaca sylvanus olfactory receptor (MSY177) gene, partial cds.

ACCESSION AF179797

KEYWORDS

SOURCE Barbary ape.

50 ORGANISM Macaca sylvanus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Macaca.

REFERENCE 1 (bases 1 to 487)

55 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 5     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES                  Location/Qualifiers  
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 15    CDS        <1..>487  
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       /product="olfactory receptor"  
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 20                  FCADHIIPHFFCDLGLALLKLCSDTSLNQLAIFTAGLTAIMPFLCILVSYGHTAVT  
                 LQPSTNGICKALSTCGSHSAVTLYYGTIIGLYFLPPSSNTNDKNIIASVIYTVVTP  
                 ML" (SEQ ID NO:286).  
 BASE COUNT   94 a   146 c   91 g   156 t  
 ORIGIN  
 25    1 tgtggccatc tgtcacccctc tacattatgc catcatcatg ggtcagagtc agtgtgtcac  
       61 gctgggtggct gggctctggg tcatcgcttg tgctgtgtct ctttgcaca ctctctct  
       121 ggcctggctt tccttcgtg ctgatcacat catccctacat ttcttcgtg accttggc  
       181 cctgtcaag tttgtctgtc cagacacacccat cctcaatcat ttagcaatct ttacaggc  
       241 atttgacagcc attatgcctc catttcgtgtc tttatgggtt ttctatggtc acactgc  
 30    301 caccatccctc cagattccctc tctactaatgg catatgcaaa gccttgcacat ctttgtggatc  
       361 ccacccctca gcagtgtactc tctattatgg gaccattattt ggttcttattt ttctcccccc  
       421 atccagcaactaaatgaca agaacaataat tgcttcgtt atatacacag tagtcactcc  
       481 catgttg (SEQ ID NO:285).

### 35     OR177

LOCUS AF179798 487 bp DNA           PRI 31-DEC-2000  
 DEFINITION Macaca sylvanus olfactory receptor (MSY178) gene, partial cds.

ACCESSION AF179798

#### 40     KEYWORDS

SOURCE Barbary ape.

ORGANISM Macaca sylvanus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;

Macaca.

#### 45     REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates

JOURNAL Unpublished

#### 50     REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

55                  1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

**FEATURES**            **Location/Qualifiers**  
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 CDS         <1..>487  
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 10           /product="olfactory receptor"  
               /translation="VAICFPLHYTAIMSPMLCLALVALSWVLTTFHAMLHTLLMARLC  
               FCADNVIPHFFCDMSALLKLACSDTQVNELAIFITGGLILVIPFLLILGSYARIVSSI  
               LKVPSSKGICKAFSTCGSHLSVSLFYGTIVIGLYFCPSANSSTLKETVMAMMYTVVTP  
               ML" (SEQ ID NO:288).  
 15    BASE COUNT    83 a   144 c   105 g   155 t  
**ORIGIN**  
       1 tggccatc tgctcccccc tgcactacac cgccatcatg agccccatgc tctgtctcg  
       61 cctgggtggcg ctgtcctggg tactgaccac ctccatgcc atgttacaca ctttactcat  
       121 ggccagggttg tgttttgtg cagacaatgt gatccccac ttttctgtg atatgtctgc  
 20       181 tctgctgaag ctggcctgct ctgacactca agttaatgaa ttggcgatata ttacacggg  
       241 agggctgatt ctgtcatcc cattcctact catccttggg tcctatgcac ggattgtctc  
       301 ctccatcttc aaggcccctt cgtctaaggg tatctgaag gccttctcta ctgtggctc  
       361 ccacctctt ctgggtgtcac tggcttatgg gaccgttataa ggtctctact tctgccccatc  
       421 agctaatagt tctactctaa aggagactgt catggctatg atgtacactg tggfacc  
 25       481 catgctg (SEQ ID NO:287).

### OR178

**LOCUS**    AF179799    484 bp    DNA            **PRI**    31-DEC-2000  
 30    **DEFINITION** Macaca sylvanus olfactory receptor (MSY179) gene, partial cds.  
**ACCESSION** AF179799  
**KEYWORDS**  
**SOURCE**    Barbary ape.  
**ORGANISM** Macaca sylvanus  
 35       Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
           Eutheria; Primates; Catarrini; Cercopithecidae; Cercopithecinae;  
           Macaca.  
**REFERENCE** 1 (bases 1 to 484)  
**AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
 40    **TITLE**    The olfactory receptor gene repertoire in primates and mouse:  
          Evidence for reduction of function in primates  
**JOURNAL** Unpublished  
**REFERENCE** 2 (bases 1 to 484)  
**AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
 45    **TITLE**    Direct Submission  
**JOURNAL** Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
           1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
**FEATURES**            **Location/Qualifiers**  
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 CDS         <1..>484  
               /gene="MSY179"

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 /product="olfactory receptor"  
 /translation="CAICCPLHYTTAMSPKLCILLSLCWVLSVLYGLIHTFLMTTVA  
 FCGSRKIHYIFCEMYVLLRLACSDTQINHTVLATGCFIFLIPFGFMIISYVLIVRAI  
 5           LRIPSVKKYKAFSTCASHGVSLFYGTLCMVYLKPLHTYSVKDSVATVMYAVVTPM  
 M" (SEQ ID NO:290).  
 BASE COUNT   102 a   139 c   93 g   150 t  
 ORIGIN  
 10           1 atgtgccatc tgctgcccc tccactacac cacagccatg agccctaagc tctgttatctt  
 61           61 actcctttcc ttgtgtggg tcttatctgt gctctatggc ctcatacaca ccttcctcat  
 121          121 gaccacgggt accttcgtg ggtcacgaaa aatccactac atcttcgtg agatgtatgt  
 181          181 attgctgagg ctggcatgtt ccgacactca gattaatcac acagtgcgtga ttgcccacagg  
 241          241 ctgtttatc ttctcattc ccttgattt catgtcattt tcctatgtt tgattgtcag  
 301          301 agccatcctc agaataccct cagtcttaaa gaaataaaaaa gccttcata cttgtcctc  
 361          361 ccatttgggt gtatgtccct tccttatgg gacacttgtt atgtatacc tgaagccccc  
 421          421 ccataccatc tctgtgaagg actcagtagc cacagtgtatc tatgcgggtt tgacacccat  
 481          481 gatg (SEQ ID NO:289).

## OR179

20           LOCUS   AF179800   487 bp   DNA       PRI    31-DEC-2000  
 DEFINITION Macaca sylvanus MSY180 pseudogene, partial sequence.  
 ACCESSION AF179800  
 KEYWORDS .  
 25           SOURCE   Barbary ape.  
 ORGANISM Macaca sylvanus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
 Macaca.  
 30           REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE   The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 35           REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE   Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 40           FEATURES      Location/Qualifiers  
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 45           /gene="MSY180"  
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 BASE COUNT   92 a   143 c   100 g   152 t  
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 1           1 tgctgccata tgccatcc tccattacac tgccatcatg agggaaagago tctgtgtctt  
 61          61 ctttagtggct gtatcttgc ttctgtcttg tgccagctcc ctcttcacca cccttcct  
 121        121 gaccacgggt tctttctgtg ctgcgaacac catccccac atcttcgtg accttgctgc  
 181        181 cttgtcaag ctgtcctggt cagatatctt cttcaatggat ctggatcatgt tcacagttag  
 241        241 ggtgggttc attaccctgc cattcatgtg tttctggta tcatatggct acactggggc  
 301        301 caccatccgt agggccctt caaccaaagg gatccacaaa gcatgttcca catgtgcctc  
 361        361 ccatctctc tggtttctc ttattatgg gcaatattt gcccaggtaac attcccaac

421 tgtaaggcgt tctattgaca aggatgtac tgtggcttc atgtacatcg tggcacacc  
481 cgtgtt (SEQ ID NO:291).

### OR180

5

LOCUS AF179801 487 bp DNA PRI 31-DEC-2000  
DEFINITION Macaca sylvanus MSY181 pseudogene, partial sequence.  
ACCESSION AF179801

KEYWORDS .

10 SOURCE Barbary ape.

ORGANISM Macaca sylvanus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Macaca.

15 REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

20 REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

25 FEATURES Location/Qualifiers

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/gene="MSY181"  
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30 BASE COUNT 92 a 144 c 100 g 151 t

ORIGIN

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35 61 cttagtggct gtatctgaa ttctgtcttg tgccagctcc ctctctcaca cccttctcc  
121 gacctcagctg ctttctgtg ctgcgaacac catccccac atcttctgtg accttgctgc  
181 cttgtcaag ctgtccctgtt cagatatctc cctcaatgag ctggcatgt tcacagttagg  
241 ggtgggttc attaccctgc cattcatgtg tattctggta tcataatggct acactgggc  
301 caccatctgtt agggccctt caaccaaagg gatccacaaa gcatgtcca catgtgcctc  
40 361 ccatctctt gggttctc tctattatgg gtcaatattt ggccagtaac attcccaac  
421 tgtaaggcgt tctattgaca aggatgtac tgtggcttc atgtacatcg tggcacacc  
481 cgtgtt (SEQ ID NO:292).

### OR181

45

LOCUS AF179802 487 bp DNA PRI 31-DEC-2000  
DEFINITION Macaca sylvanus olfactory receptor (MSY182) gene, partial cds.  
ACCESSION AF179802

KEYWORDS .

50 SOURCE Barbary ape.

ORGANISM Macaca sylvanus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Cercopithecidae; Cercopithecinae;  
Macaca.

55 REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 5     REFERENCE 2 (bases 1 to 487)  
       AUTHORS Giorgi,D.G. and Rouquier,S.P.  
       TITLE Direct Submission  
       JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
           1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 10    FEATURES Location/Qualifiers  
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 20      /translation="VAICKPLHYMVIMNNRVCTLLVLCSWVAGLMIVPPPLSLGLQLE  
           FCGSNAIDHFSCDAGPLLKISCSDTWVIEQIVILMAVFALIITLVCVILSYLYIVRTI  
           LRFPSVQQRKKAFSTCSSHMIVVSIAYGSCIFVYIKPSAKDEVAINKGVSVLTTSVAP  
           LL" (SEQ ID NO:294).  
 25    BASE COUNT 115 a 113 c 98 g 161 t  
 ORIGIN  
       1 tgtggccatc tgtaaaccccc ttcatatataat ggtcatcatg aacaacaggg tttgttacatt  
       61 attatgcctc tgcagggtgg tggctggctt gatgtatcatt gtccaccac ttagctttagg  
       121 cctccagtc gaattctgtg gtcataatgc cttgtatcat ttagctgtg atgcagggtcc  
       181 ttcctaaag atctcatgtc cagacatcgat ggtatagaa cagatagtt tacttatggc  
 30      241 tgtatgtca ctcattatca cccttagttt ttttgttgc tcctactgt acatagtccag  
       301 aacaattctg aggttccctt ctgttcagca aaggaaaaag gcctttctta cctgttcatc  
       361 ccacatgatt ttgggttcca ttgcctatgg aagctgcata tcgttctata tcaagccctc  
       421 tgcaaaaatg gaagtggccaa taaataaagg agtttcagtt ttactactt ctgtgcacc  
       481 ctgttg (SEQ ID NO:293).

## 35     OR182

LOCUS AF179803 487 bp DNA     PRI 31-DEC-2000  
 DEFINITION Callithrix jacchus olfactory receptor (CJA169) gene, partial cds.  
 40     ACCESSION AF179803  
 KEYWORDS  
 SOURCE Callithrix jacchus.  
 ORGANISM Callithrix jacchus  
       Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 45      Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
 REFERENCE 1 (bases 1 to 487)  
       AUTHORS Giorgi,D.G. and Rouquier,S.P.  
       TITLE The olfactory receptor gene repertoire in primates and mouse:  
           Evidence for reduction of function in primates  
 50    JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
       AUTHORS Giorgi,D.G. and Rouquier,S.P.  
       TITLE Direct Submission  
       JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 55      1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

**FEATURES**            **Location/Qualifiers**  
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 10     product="olfactory receptor"  
               /translation="VAICRPLYYSTVMSPQVCALILALCWVLTNVVALTHTLMARLS  
               FCVTGEIAHFFCDITPVLKLSCSDTHINEMMFVLGGTVLIVPFICIVTSYIHIVPAI  
               LRVRTCAGGAKAFSTCSSHLCIVCIFYGTLFSAYLCPPSIASEEKDIAAAALYTIVTP  
               ML" (SEQ ID NO:296).  
 15    BASE COUNT    89 a   147 c   103 g   148 t  
**ORIGIN**  
       1 tgtggccatt tgccgcccc tgtaacttc cacagtcatg agcccccaag tctgtgccct  
       61 aatccctgca ttgtgctggg tcctcaccaa tggtttgcc ctgactcaca cactcctcat  
 121 ggctcgactg tcctctgtg tgactggga aatacgctac ttttctgtg acatcactcc  
 181 tgcctgaag ctatcatgtt ctgacaccca catcaacgag atgatggttt ttgtcttggg  
 241 aggacacaga ctcatgtcc cctttatatg cattgtcacc tcctacatcc acattgtgcc  
 301 tgctatcctg agggtccgaa cctgtgggg ggcgggcaag gcctttcca cctgcagttc  
 361 ccacctctgc attgttgta tattctatgg gaccctcttc agtgccctacc ttgtccctcc  
 421 ctctattggc tctgaagaga aggacattgc agcagctgca ctgtatacca tagtgactcc  
 481 catgtt (SEQ ID NO:295).

### OR183

**LOCUS**    AF179804    486 bp    DNA            **PRI**    31-DEC-2000  
 30    **DEFINITION** Callithrix jacchus olfactory receptor (CJA170) gene, partial cds.  
**ACCESSION** AF179804  
**KEYWORDS**  
**SOURCE** Callithrix jacchus.  
**ORGANISM** Callithrix jacchus  
 35    Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
       Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
**REFERENCE** 1 (bases 1 to 486)  
**AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
**TITLE** The olfactory receptor gene repertoire in primates and mouse:  
 40    Evidence for reduction of function in primates  
**JOURNAL** Unpublished  
**REFERENCE** 2 (bases 1 to 486)  
**AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
**TITLE** Direct Submission  
 45    **JOURNAL** Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
       1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
**FEATURES**            **Location/Qualifiers**  
 source        1..486  
               /organism="Callithrix jacchus"  
               /db\_xref="taxon:9483"  
 50    gene       <1..>486  
               /gene="CJA170"  
 CDS        <1..>486  
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               /codon\_start=1



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181 ctccttgcg ctctccgtca acagcttta cataaattt ctgtgggtt ttatattgt  
241 gaccatggc attgggggtc ccattgtcac catttttac tcttatgggtt ttatcttc  
301 cagcattctc cacatttagtt ctgctgaggc caggtctaaa gccttcgatc cctgcagc  
361 ccacatagg gtggattgc ttttcttgg gtcaggagct ttatgttacc tcaaaccacc  
421 ttctattcta cccctggacc aggggaaagt gtcctccatt ttataactg cggtgggtcc  
481 catgtt (SEQ ID NO:299).

### OR185

10 LOCUS AF179806 487 bp DNA PRI 31-DEC-2000  
DEFINITION Callithrix jacchus olfactory receptor (CJA196) gene, partial cds.  
ACCESSION AF179806  
KEYWORDS  
15 SOURCE Callithrix jacchus.  
ORGANISM Callithrix jacchus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
REFERENCE 1 (bases 1 to 487)  
20 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
25 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
30 source 1..487  
/organism="Callithrix jacchus"  
/db\_xref="taxon:9483"  
gene <1..>487  
/gene="CJA196"  
35 CDS <1..>487  
/gene="CJA196"  
/codon\_start=2  
/product="olfactory receptor"  
/translation="LAICHPLHYSSKMSLCSCTLMLGCLWTTASLHALLHTLLARLD  
40 FCASNVIPYFFCDLVPLQLSCSDTRNQLMIVLVGGIILLPFLGILGSYTCIAAV  
LRVPSARGTWKAFSTCGSHLTMVILFYGTISGVYLRPSSHSTDKDSLAVVMYMYVVTP  
ML" (SEQ ID NO:302).  
BASE COUNT 78 a 176 c 105 g 128 t  
ORIGIN  
45 1 cttggccatc tgccacccgc tgcactactc ctccaaggatg agccgtgcga gtcgcaccc  
61 aatgtgggc tgcattatgg ccactgcccag ctcctcatgcc ctctgcaca cccttcctt  
121 ggcccggtcg gactctgtg ccageaatgt tatccccatc ttctctgtg acctcggtcc  
181 cctgtccatcg ctctccgttt ctgacaccccg actcaaccag ctcatgatg tgctgggtgg  
241 gggcctgatc atccctcgtc ccttccttgg cattctcggt tcctacacat gcattgcgc  
301 tgcagtgcgc agagtccctt ctgccaggggg tacgtggaa ggcctttcca cctgtggc  
361 ccacctgacc atggtcatcc tctctatgg caccatctca ggggtctacc tgaggccctc  
421 atccctccac tccacagaca aggactcaact agccctcgtg atgtacatgg tagtgacccc  
481 catgtc (SEQ ID NO:301).

### OR186

LOCUS AF179807 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Callithrix jacchus olfactory receptor (CJA197) gene, partial cds.  
 ACCESSION AF179807  
 5 KEYWORDS  
 SOURCE Callithrix jacchus.  
 ORGANISM Callithrix jacchus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
 10 REFERENCE 1 (bases 1 to 487)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE The olfactory receptor gene repertoire in primates and mouse:  
         Evidence for reduction of function in primates  
     JOURNAL Unpublished  
 15 REFERENCE 2 (bases 1 to 487)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE Direct Submission  
     JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
         1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 20 FEATURES Location/Qualifiers  
     source 1..487  
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 25       /gene="CJA197"  
     CDS <1..>487  
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         /codon\_start=2  
         /product="olfactory receptor"  
 30       /translation="VAICHPLHYTVTINPRLCGLLVLASWILSALNSSLQTLIVRLS  
         FCTDLEIPHFCELNQVIHLACSDTFLNDVVMYLAAVLLGGGPLAGILYSYSKIVSSI  
         RAISSAQGKYKAFSTCVSHILIVSLFYGTLLGVYLSSAATGNSHSRAAASVMYTVVTP  
         ML" (SEQ ID NO:304).  
 35 BASE COUNT 98 a 134 c 100 g 155 t  
 ORIGIN  
     1 tgttgccata tgtcacccac tgcactacac agtcaccatt aaccccagac tgtgtggact  
     61 gctggttctg gcatcctgga tcctgagtgcc cctgaattcc tcattacaaa ccttaatagt  
     121 gctggggctt cccttctgca cagacttgga aatccccac ttttctcgcc aacttaatca  
     181 ggtcatccac ctgcctgtt ctgacacittt tcattaatgtat gtgggtatgt atttggccgc  
 40      241 tgtgctgtgtt ggggggtggc cccttgcagg gattcttac tcctactcta agatagttc  
     301 ctccataactt gcaatctcat cagctcaggaa gaagtacaag gcattttcca cctgtgtatc  
     361 tcacatctta attgtctctt tattttatgg tacactctta gggtgttacc tttagttctgc  
     421 tgcaactggc aactcacattt caagagctgc agcctcggtg atgtacactg tggtcaccc  
     481 catgctg (SEQ ID NO:303).

45

## OR187

LOCUS AF179808 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Callithrix jacchus olfactory receptor (CJA198) gene, partial cds.  
 50 ACCESSION AF179808  
 KEYWORDS  
 SOURCE Callithrix jacchus.  
 ORGANISM Callithrix jacchus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.

**REFERENCE 1** (bases 1 to 487)  
**AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
**TITLE** The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
**JOURNAL** Unpublished  
**REFERENCE 2** (bases 1 to 487)  
**AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
**TITLE** Direct Submission  
**JOURNAL** Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
**FEATURES** Location/Qualifiers  
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     /product="olfactory receptor"  
     /translation="IAICSPLLYNVIMSYHFCFRLTVGVYILGILGSTIHTSSMLRLF  
     LCKTNVINHYFCDFPLLELSCTSSTYINELLVLVLSALNILTALIASIFTIASI  
     LHIRSTEGRSKAFSTCSSHISAVAVFFGSAAFMYLQPSSVSSMDQGVSSVFYTTVVP  
     ML" (SEQ ID NO:306).  
**BASE COUNT** 101 a 138 c 87 g 161 t  
**ORIGIN**  
 1 cattggccatc tgttagccccct tgctgtacaa tgcatcatg tcctatcact tctgttccg  
 61 gcacacagtg ggagtttaca tttaggcat ccttggatct acaattcaca ccagcttat  
 121 gttagactc ttctgtgc aaactaatgt gattaaccat tatttttgt atcttccc  
 181 tctttggaa ctcttcgtc ccagttaccta catcaatggaa ttacttagttc tggctttgag  
 241 tgcattgtaat atcttgacgc ctgccttaac tatctggcc tcttataatc tcaccattgc  
 301 cagtatcctc cacattcgct ccactggaggg cagggtccaaa gccttcagca ctggcagctc  
 361 ccacatctca gctgttgctg tctttttgg atctgcagca ttcatgtacc tgcagccatc  
 421 atctgtcagt tccatggacc aggggaaagt gtcatgttg tttagcacaa ctgttgtgcc  
 481 cactctg (SEQ ID NO:305).

OR188

LOCUS AF179809 469 bp DNA PRI 31-DEC-2000  
40 DEFINITION Callithrix jacchus olfactory receptor (CJA199) gene, partial cds.  
ACCESSION AF179809  
KEYWORDS .  
SOURCE Callithrix jacchus.  
ORGANISM Callithrix jacchus  
45 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Callitrichidae; Callithrix.  
REFERENCE 1 (bases 1 to 469)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
50 Evidence for reduction of function in primates  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 469)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
55 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES	Location/Qualifiers
source	1..469 /organism="Callithrix jacchus" /db_xref="taxon:9483"
gene	<1..>469 /gene="CJA199"
CDS	<1..>469 /gene="CJA199" /codon_start=2 /product="olfactory receptor" /translation="VAICHPLHYTTVMSRGGLCCVLVAASWMGGFVHSTVQTILTIRLP FCGPNQVDNFFCDVPPVIKLACADTFVIELLMSNSGLISTSSFVVLISSYTTILVKI HSKEGRRKALSTCASHLMVVTLFGPCSFYPHPFSTFSVDKVMVSLYKVITPML" (SEQ ID

15 NO:308).

**BASE COUNT**    91 a    126 c    97 g    155 t

## ORIGIN

1 tgggtttatc ttgttccccc tgcactacac cactgtcatg agtcggggat tatgttgt

61 gttggttgct gcctcctgga tgggaggatt tgtgcactcc accgtccaga ccattctcac

20            121 tatccgtctg cccttttgtt ggccaaatca ggtggacac ttttttgtt atgtcccc  
 181 tgtcaaaaa ctgcgttgt ctgcacattt tgcatgttta ttgcatacg taactaacag  
 241 tgggtgtatc tccaccaggct ctttttgtt gctgatttcc tcctacacca ctatccatg  
 301 caagatccac tccaaggagg gaaggcgaaa ggcaactctt acatgtgcct ctccatatt  
 361 ggtggtaaca cttttgac cctgtatgtt catctatctt catcccttctt ctatatttc  
 421 tggtggacaag atgggtgttg tacttacaa gtttattact ccaatgc (SEO ID NO:

OR189

LOCUS AF179810 488 bp DNA PRI 31-DEC-2000

**30 DEFINITION** *Callithrix jacchus* olfactory receptor (CJA201) gene, partial cds.

ACCESSION AF179810

## KEYWORDS

SOURCE Callithrix jacchus.

35 **ORGANISM** *Callithrix jacchus*  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Platyrrhines

## REFERENCE 1 (bases 1 to 488)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reducti

## JOURNAL Unpublished

## REFERENCE 2 (bases 1 to

**AUTHORS** Giorgi,D.G. and Rouquier,S.P.  
**TITLE** Direct Submission  
**JOURNAL** Submitted (24 AUG 1999) Institut de Géologie, Université CNRS, UPR

JOURNAL Submitted (24-AUG-1999)  
1142 rue de la Concorde, Montréal

1142, rue de la

FEATURES	Location/Qualifiers
1. 488	

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(*canariensis* = "Gallithrinus")

50 /organism= Call (all unsatisfied)

/db\_xref=taxon:9483

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CDS <1..>488  
/gene="CJA201"  
/codon\_start=2

5 /product="olfactory receptor"  
 /translation="VAICFPLRYMLLMSHSICVTMIVCWSISIAGALILTVFTMHLP  
 YCGPYKINHFFCEVPVLKLACADTSFNDRLDFILGFILLVPLSLASFYVFIFASI  
 FRIRSAQGRLKSFSTCASHVTVVTMFYGPAIMYMRPGSWYDPERDKLALFYNVVSG  
 FL" (SEQ ID NO:310).  
 BASE COUNT 84 a 145 c 105 g 154 t  
 ORIGIN  
 10 1 cgttgcatt tgctcccccc ttgcctatat gctactcatg agccattcca ttgtgtcac  
 61 gatgattata gtttgtgg cttagatc agtggggcc ctgatccca ctgttcac  
 121 catgcattcg ccttattgtg gcccctacaa gataaaccac ttcttcgtg aggtccctgc  
 181 tgtccctgaag ttggcctgtg cagacacatc tttaatgac aggctggact tcatactggg  
 241 ttccatccctg ctggcgtcc cactctccct catccctggcc tcacgtct tcacccatc  
 301 ctctatcc agaatccgt cagcgcagg gaggctcaag tccttcaca cgttgcttc  
 361 ccacgtcaact gtggtcacca tgttctatgg gccggccatc atcatgtaca tgaggcccg  
 421 ttcttgat gacccagagc gggacaagaa gctagcgttg ttctacaatg tggctctgg  
 481 cttccctea (SEQ ID NO:309).

## OR190

20 LOCUS AF179811 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Callithrix jacchus olfactory receptor (CJA202) gene, partial cds.  
 ACCESSION AF179811  
 KEYWORDS  
 SOURCE Callithrix jacchus.  
 25 ORGANISM Callithrix jacchus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrhini; Callitrichidae; Callithrix.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 30 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 35 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..487  
 40 /organism="Callithrix jacchus"  
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 gene <1..>487  
 /gene="CJA202"  
 CDS <1..>487  
 45 /gene="CJA202"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICHPLRYTATMNRLCVQLVAGLWLVTYLHALLHTSLIAHLS  
 FCAFNIHHFFCDLNPLLRLSCAVSFNVMIIIFAVGGLALTPLVCILVFYGLIFSTV  
 50 LKITSTQGKQRAASTCGCHLSVVVLFYGTIAAVYFSPSSHTPESDTLSTVMYSVVAP  
 ML" (SEQ ID NO:312).  
 BASE COUNT 86 a 152 c 94 g 155 t  
 ORIGIN  
 55 1 tggcaatt tgccacccct tacgttacac tgccacaatg aacctgcgcc ttgtgtcca  
 61 gctagtggct ggactgtggc ttgttactta cttccatgg cttccatca cttccataat

121 agcacatctg tccttctgtg ccttcaatat catccatcat ttcttctgtg atctcaaccc  
181 tctactacgg ctctcttgct ctggcgctc ctcaacgta atgatcattt ttgcagtagg  
241 aggtctattg gtcctcacgc cccttgtctg tatcctcgta ttttatggac ttatctctc  
301 cactgttctg aagatcacct ctactcaggaaacagaga gctgcttcca cctggggctg  
361 ccacccgtca gtagtggtc tgttttatgg cacagccatt gccgtctact tttagcccc  
421 atccctcccat acgcctgaga gtgcacactct ctgcaccgtc atgtattcag tggggcccc  
481 gatgctg (SEQ ID NO:311).

### OR191

10

LOCUS AF179812 491 bp DNA PRI 31-DEC-2000

DEFINITION Pongo pygmaeus PPY110 pseudogene, partial sequence.

ACCESSION AF179812

KEYWORDS .

15

SOURCE orangutan.

ORGANISM Pongo pygmaeus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 491)

20

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 491)

25

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

30

source 1..491  
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gene <1..>491  
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/pseudo

35 BASE COUNT 92 a 118 c 105 g 176 t

ORIGIN

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121 aatgtttatg tccttttgta gagacaacct tgtaaatcac tatctgttg acatccctcc  
181 tctccctgag ctccctgcac acagctcta cataaaatttgc ctgggtttttt ttatattgt  
241 gaccattggc attgggggtgc caattgtcac catttttac tcttattggg ttatctttc  
301 cagcattctc cacat tagct cacagaggc aggtcaggc taaagccttc agtacactgca  
361 gttccccat aatttgttgc tgcgttttctt tgggtcagg tgcttcatg tacctcaaac  
421 cacccttc tctaccctcg gaccaggggaa aagtgtccctc cattttttat actgtgtgg  
481 tgcccatgtt t (SEQ ID NO:313).

### OR192

50

LOCUS AF179813 480 bp DNA PRI 31-DEC-2000

DEFINITION Pongo pygmaeus PPY111 pseudogene, partial sequence.

ACCESSION AF179813

KEYWORDS .

SOURCE orangutan.

55

ORGANISM Pongo pygmaeus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 REFERENCE 1 (bases 1 to 480)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 5 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 480)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 10 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source     1..480  
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         /db\_xref="taxon:9600"  
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         /gene="PPY111"  
         /pseudo  
 20 BASE COUNT   81 a   141 c   100 g   158 t  
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     1 tgtggccatc tgettcccccc tgcactacac catccatcat gagccccatg ctctgtctct  
     61 cccctttggc gctgtccctgg gtgcgtgacca ccttccatgc catgttacac actttactca  
     121 tggccagggt gtgttttgttgcagacaatgt tgatccccca cttttctgt gatatgtctg  
 25      181 ctctgctgaa gctgtcctgc tctgacactc gagttaatga attggtgata ttatcatgg  
     241 gagggctcat tcttgcattc ccattccatc tcattttgg gtcctatgca cgaattgtct  
     301 cctccatctt caagggtccct tctaagggtt tctgcaaggc cttctctact tggtggctccc  
     361 acctctctgt gggtgtccctg ttctatggga ccgttagtgg tctctactta tgcccatcg  
     421 ctaatagttc tactctgaag gagactgtca tggctgttaat gtacactgtg gtgaccccca (SEQ ID NO:314).  
 30

### OR193

LOCUS AF179814 486 bp DNA PRI 31-DEC-2000  
 DEFINITION Pongo pygmaeus olfactory receptor (PPY112) gene, partial cds.  
 35 ACCESSION AF179814  
 KEYWORDS  
 SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 40      Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 REFERENCE 1 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 45 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 50      1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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 55      gene     <1..>486

CDS                    /gene="PPY112"  
 5                    <1..>486  
 /gene="PPY112"  
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 /product="olfactory receptor"  
 /translation="CAICHPLHYATIMSOSQCVMLVAGSWVIACACALLHTLLARLS  
 FCADHIISHFFCDLGLALKLSCSDTSLNQLAIFTAGLTAIMLPFLCILVSYGHIGVTI  
 LQIPSTKGICKALSTCGSHLSVVTIYYGT!!GLYFLPPSSNTNDKNIIASVIYTVVTP  
 ML" (SEQ ID NO:316).  
 10    BASE COUNT    96 a   147 c   93 g   150 t  
 ORIGIN  
 15                    1 tgtgccatct gtcaccctct acattatgcc accatcatga gtcagagcca gtgtgtcatg  
 61 ctggcggctg ggtccctgggt catcgcttgt gcgtgtgc tttgcataac ctccttctg  
 121 gccccggttt ccttcgtgc tgaccacatc atctctcaact tcttcgtga ccttggcgcc  
 181 ctgctcaaggc tgcctgctc agacacctcc ctcaatcagt tagcaatctt tacagcaggaa  
 241 ttgacagccaa ttatgcgtcc attcctgtgc atccctgggtt cttatggtaa catgggggtc  
 301 accatccctc agattccctc caccaaggcc atatgcggaa ccttggccac ttggatcc  
 361 cacccctcaag tggtgactat ctattatggg acaattatggt gtctctattt tctacccccc  
 421 tccagcaaca ccaatgacaa gaacataattt gcttcagtga tatacacatgt agtcaactccc  
 20                    481 atgttg (SEQ ID NO:315).

#### OR194

LOCUS    AF179815    487 bp    DNA    PRI    31-DEC-2000  
 25    DEFINITION Pongo pygmaeus PPY113 pseudogene, partial sequence.  
 ACCESSION AF179815  
 KEYWORDS .  
 SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
 30    Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 35    Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 40    JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES            Location/Qualifiers  
 source            1..487  
 /organism="Pongo pygmaeus"  
 45    /db\_xref="taxon:9600"  
 gene            <1..>487  
 /gene="PPY113"  
 /pseudo  
 BASE COUNT    107 a   130 c   95 g   155 t  
 50    ORIGIN  
 1 cactgccatt tgcacccttc taagataaac caatctcatg agacccaaaa ttgtggact  
 61 tatgactgcc ttctccgtga tcctggctc tacggatgga atcattgtatc ctgcagcgac  
 121 atttcccttc tcctactgtg ggtctcggtt aatagccac ttcttcgttg agtcccttc  
 181 catactaatac ctctcatgca atgacacatc aatattgaa aagggtttt tcatctgtt  
 55    241 tatagtatgtt atgttttc ctgttcaat catcatgct tcctatgctc aaggattttt



## OR196

LOCUS AF179817 483 bp DNA PRI 31-DEC-2000  
DEFINITION Pongo pygmaeus olfactory receptor (PPY115) gene, partial cds.  
5 ACCESSION AF179817  
KEYWORDS  
SOURCE orangutan.  
ORGANISM Pongo pygmaeus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
10 Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
REFERENCE 1 (bases 1 to 483)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
15 JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 483)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
20 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..483  
/organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"  
25 gene <1..>483  
/gene="PPY115"  
CDS <1..>483  
/gene="PPY115"  
/codon\_start=1  
30 /product="olfactory receptor"  
/translation="VAVCHPLHYTLIMHGLCLGLVAGCLVAGFMNSLMETIITFQLL  
LCHNVINHFACETLAVLRLACVDVSFNKAMVAISGFLVILLPCSLILFSYAHIVAAIL  
HIPSAQGRRKAFTGTCTSHLTVVCMCFGATMFTYMRPAGGSSLEKKNMVALFYAIVPM  
L" (SEQ ID NO:321).  
35 BASE COUNT 86 a 136 c 115 g 146 t  
ORIGIN  
1 gtggccgtct gccacccact gcattacacg ctcatcatgc atggaggcgt gtgcctgggg  
61 ctggtgccg gctgcctggat ggctggttc atgaattccc tgatggaaac aattatcacc  
121 ttccagcttc tcctgtgtca caatgttatt aatcactttg cctgtgagac cttagcagt  
40 181 ctacgactag cctgtgtggaa cggtcttc aacaaggcca tggtgccat ctcagggttt  
241 ctggtgatcc tgctccctgc ttcaactgtatc ctatccctt atgtccat agtgtgtcc  
301 attcttcata ttcccttcgc ccaggacgc cgcaaaagct ttggggactt cacgtctcac  
361 ctcaactgtgg ttgcatgtc ctttggggctt acaaatttca cttacatgtt acctgcgggc  
421 ggctctccccc tggaaaagaa gaatatgtt ggcctttt atgcattgtt gattccatgt  
45 481 ctt (SEQ ID NO:320).

## OR197

LOCUS AF179818 484 bp DNA PRI 31-DEC-2000  
DEFINITION Pongo pygmaeus olfactory receptor (PPY116) gene, partial cds.  
50 ACCESSION AF179818  
KEYWORDS  
SOURCE orangutan.  
ORGANISM Pongo pygmaeus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 REFERENCE 1 (bases 1 to 484)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 5 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 484)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 10 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
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 15       /db\_xref="taxon:9600"  
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         /gene="PPY116"  
 CDS     <1..>484  
         /gene="PPY116"  
 20       /codon\_start=2  
         /product="olfactory receptor"  
         /translation="VAVCHPLHYTLIMHGLCLGLVAGCLVAGFMNSLMETIITFQLP  
           LCHNVINHFACETLAVLRLACVDVSFNKATVAISGFLVILLPCSLILFSYAHIVAAIL  
           RIPSAQGHRKAFGTCTSHLTVVCMCFGATMFTYMRPAGGSSLEKENMVALFYAIVPM  
 25       L" (SEQ ID NO:323).  
 BASE COUNT    85 a   138 c   116 g   145 t  
 ORIGIN  
   1 tgtggccgtc tgccacccac tgcattacac gtcatcatg catggaggc tggcctgg  
   61 gctggtgcc ggctgcctgg tggctggtt catgaattcc ctatggaaa caattatcac  
 30   121 ctccagttt cccctgtgtc acaatgttat taatcacttt gcctgtgaga ctttagcagt  
   181 gctacgacta gcctgtgtgg acgtctccctt caacaaggcc acgggtggcca ttcagggtt  
   241 tctgggtatc ctgcctccctt gttcaactgtatctcc tatgtcaca tagttgtc  
   301 cattttcgat attccctgtc cccaggacca ccgcaaaagcc ttgggacctt gacgtctca  
   361 cctcaactgtg gtttgcattgt gctttggggc tacaatgttc acctacatga gacctgggg  
 35   421 tggctcccttcc ctggaaaagg agaatatgtt tgccctttt tatgccattt tgattccat  
   481 gctt (SEQ ID NO:322).

## OR198

40 LOCUS AF179819 479 bp DNA PRI 31-DEC-2000  
 DEFINITION Pongo pygmaeus PPY117 pseudogene, partial sequence.  
 ACCESSION AF179819  
 KEYWORDS .  
 SOURCE orangutan.  
 45 ORGANISM Pongo pygmaeus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 REFERENCE 1 (bases 1 to 479)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 50 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 479)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 55 TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..479  
5 /organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"  
gene <1..>479  
/gene="PPY117"  
/pseudo  
10 BASE COUNT 100 a 115 c 91 g 173 t  
ORIGIN  
1 tgtagccata tgcaaaccct tatactatgt ggtcatcatg agccgaaggc caccgcactgt  
61 ctggtaatg atctccctggg ctgtggcgtt ggtgcacaca ttaagccagt tatcattttac  
121 tggtaacccgt ccttttttgtt ggacctaattt tagtagacag ctttttttgtt gatcttcctc  
15 181 gagtgaccacaa acttgcccttc ctggactttt accttcattttt aatactaaattt gtggcaata  
241 gtggaggatctt ttccctaaggc acttttcgtt ctttggcttccatc atttttttttctt  
301 ttatggttttt gctcaagtctt tcggcttccaa tggcgaaggc atttttttctt gatcttccttcc  
361 atattgcagt agtaatattt ttcttggac ctgttttttccatcatttttgc ttggcccttta  
421 ccatcttatcc ttggataaaa ctcttgcac ttttttttccatcatttttgc ttggcccttta (SEQ ID NO:324).  
20

**OR199**

LOCUS AF179820 487 bp DNA PRI 31-DEC-2000

DEFINITION Pongo pygmaeus olfactory receptor (PPY118) gene, partial cds.

25 ACCESSION AF179820

KEYWORDS

SOURCE orangutan.

ORGANISM Pongo pygmaeus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
30 Eutheria; Primates; Catarrhini; Hominidae; Pongo.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

Evidence for reduction of function in primates

35 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

40 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487  
45 /organism="Pongo pygmaeus"  
/db\_xref="taxon:9600"  
gene <1..>487  
/gene="PPY118"  
CDS <1..>487  
/gene="PPY118"  
/codon\_start=2  
50 /product="olfactory receptor"  
/translation="VAICHPLHYATIMSQCVMLVAGSWVIACACALLHTLLARLS  
FCADHIISHFFCDLGALLKLSCSDTSNQLAIFTAGLTAIMLPFLCILVSYGHIGVTI  
LQIPSTKGICKALSTCGSHLSVVTIYYGTIIGLYFLPPSSNTNDKNIIASVIYTVVTP  
ML" (SEQ ID NO:326).  
55 BASE COUNT 95 a 147 c 94 g 151 t

## ORIGIN

1 tgtggccatc tgcacccctc tacattatgc caccatcatg agtcagagcc agtgtgtcat  
61 gctggggctt gggctctggg tcatcgcttg tgccgtgtctt ctttgcata ccctcccttct  
121 ggcccggtt tccttcgtt ctgaccacat catctctcac ttcttcgtt accttgggtc  
181 cctgtcaag ctgtccgtt cagacaccctc ctcataatcg ttacaatctt acagcagg  
241 attgacagcc attatgtttt catttcgtt catttcgtt ttttatggtc acatgggt  
301 caccatccctc cagatccctt ccaccaaggg cataatgaaa gccttgtcca ctgtggatc  
361 ccactctca gtggtgacta tctattatgg gacaattattt ggtcttattt ttctcccc  
421 atccgcaac accaatgaca agaacataat tgcttcgtt atatacacag tagtcactcc  
481 catttt (SEQ ID NO:325).

OR200

LOCUS AF179821 475 bp DNA PRI 31-DEC-2000  
 DEFINITION Pongo pygmaeus PPY119 pseudogene, partial sequence.  
 ACCESSION AF179821  
 KEYWORDS  
 SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 REFERENCE 1 (bases 1 to 475)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 475)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..475  
         /organism="Pongo pygmaeus"  
         /db\_xref="taxon:9600"  
     gene <1..>475  
         /gene="PPY119"  
         /pseudo  
 BASE COUNT 98 a 119 c 104 g 154 t  
 ORIGIN  
     1 gtggccataa gcaaacctct ccactatgca atcatcatga actcatgcac atgtacaggc  
     61 ccagtggtag gctcttgggt cattgggggtt atgcactccc tgagccagggt agctttcact  
     121 gtaagcttgc cttctgtgg cccaaacata gtggacagggt attattgcga ctttactttg  
     181 gtcataacaac gtgcctgtac agatgtttat atccccaaatgttgtatgttttggacgggt  
     241 ggtcttatgg gggtgaccat ttgttgcattt gtcgtatcc tacacggcata ttctgttac  
     301 tgtgcagcga cattcctcag caggatgttgc caaggctcac ageactctga ctggccacat  
     361 tgctgtgggtt accgtgttctt tggggccctgtt atcttcata tatgcctggc ctttcagcaa  
     421 cttaccagggt gataaacattt tgctgttattt ctctgttagt ttcacaccta tatta (SEQ ID NO:327).

50 OR201

LOCUS AF179822 487 bp DNA PRI 31-DEC-2000  
DEFINITION Pongo pygmaeus olfactory receptor (PPY120) gene, partial cds.  
ACCESSION AF179822

SOURCE orangutan.  
 ORGANISM Pongo pygmaeus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Catarrhini; Hominidae; Pongo.  
 5     REFERENCE 1 (bases 1 to 487)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE The olfactory receptor gene repertoire in primates and mouse:  
         Evidence for reduction of function in primates  
     JOURNAL Unpublished  
 10    REFERENCE 2 (bases 1 to 487)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE Direct Submission  
     JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
         1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 15    FEATURES Location/Qualifiers  
     source    1..487  
               /organism="Pongo pygmaeus"  
               /db\_xref="taxon:9600"  
     gene      <1..>487  
 20      /gene="PPY120"  
     CDS       <1..>487  
               /gene="PPY120"  
               /codon\_start=2  
               /product="olfactory receptor"  
 25      /translation="VAICHPLHYATTMSQSQCVMLVAGSWVIACACALLHTLLARLS  
         FCADHIIPHFCDLGALLKSCSDTSNQLAIFTAGLTAIMLPFLCILVSYGHIGVTI  
         LQIPSTKGICKALSTCGSHLSVVTIYYGTIIGLYFLPPSSNTNDKNIIASVIYTVVTP  
         ML" (SEQ ID NO:329).  
 30    BASE COUNT   95 a   150 c   94 g   148 t  
 ORIGIN  
     1 tgtggccatc tgtcacccctc tacattatgc caccaccaatc agtcagagcc agtgtgtcat  
     61 gctgggtggct gggccctggg tcatcgcttg tgccgtgtct ctttgcata cccctttct  
     121 ggccggccat tccttctgtg ctgaccacat cattccacac ttcttctgcg accttgggtc  
     181 cctgtcaag ctgtcctgtc cagacacaccc cctcaatcag tttagcaatct ttacaggcagg  
 35      241 attgacagcc attatgttc cattccctgt catcctgggt tcttatggtc acattggggat  
     301 caccatccctc cagatccctc ccaccaaggg catatgcaaa gccttgcac ttgtggatc  
     361 ccacccctca gtggtgacta tctattatgg gacaattattt ggtctctattt ttctcccccc  
     421 atccagcaac accaatgaca agaacataa tgcttcagtg atatacacag tagtcactcc  
     481 catgttg (SEQ ID NO:328).  
 40    **OR202**  
 LOCUS AF179823 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Saimiri sciureus olfactory receptor (SSC184) gene, partial cds.  
 45    ACCESSION AF179823  
 KEYWORDS  
 SOURCE common squirrel monkey.  
 ORGANISM Saimiri sciureus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 50      Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 487)  
     AUTHORS Giorgi,D.G. and Rouquier,S.P.  
     TITLE The olfactory receptor gene repertoire in primates and mouse:  
         Evidence for reduction of function in primates  
 55    JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 5 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..487  
     /organism="Saimiri sciureus"  
     /db\_xref="taxon:9521"  
 10 gene <1..>487  
     /gene="SSC184"  
 CDS <1..>487  
     /gene="SSC184"  
     /codon\_start=2  
 15 /product="olfactory receptor"  
     /translation="VAICYPLHYTAIMREGLCAFLVAWSWIPSCASSLSHTLLTPLP  
     FCDANTVHFFCDLAALLKLSCSDIFLNELVMTVGVVVITLPFMCILVSYGYTGATI  
     LRVPSTKGIRKALSMCGSRLSVSLYGSIFGQYLFPVSSSIDKDVIDVALMYTVVTP  
     ML" (SEQ ID NO:331).  
 20 BASE COUNT 88 a 142 c 106 g 151 t  
 ORIGIN  
     1 tgttgccata tgttaccctc tccactacac tgccatcatg agggaaaggcc tctgtgcctt  
     61 cttagtggct gtatcttggta ttccatcttg tgcctagtc ccctctcaca ccctctctgt  
     121 gaccggcgctg ccttctgtg atgcaaacac cgccacacc ttcttctgtg accttgctgc  
 25 181 cctgtcaag ctgtcctgct cagatatctt cctcaatggat ctggcatgt tcacagttagg  
     241 ggtggggcattaccctgc cattcatgtg tatcctggta tcataatggct acactggggc  
     301 caactatctg agggccctt caaccaaagg gatccgaaa gctgtgtcca tggtggctc  
     361 ccgtctctctgtgtgtctc tgtattatgg ctaaatattt ggcagtagacc tttcccaac  
     421 tgtaaggcgt tccattggaca aggtatgtat tgcgtgcata atgtacacag tggtcacacc  
 30 481 catgtcg (SEQ ID NO:330).

### OR203

LOCUS AF179824 488 bp DNA PRI 31-DEC-2000  
 35 DEFINITION Saimiri sciureus olfactory receptor (SSC185) gene, partial cds.  
 ACCESSION AF179824  
 KEYWORDS .  
 SOURCE common squirrel monkey.  
 ORGANISM Saimiri sciureus  
 40 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 488)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 45 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 488)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 50 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..488  
     /organism="Saimiri sciureus"  
 55 /db\_xref="taxon:9521"

gene <1..>488  
   /gene="SSC185"  
 CDS <1..>488  
   /gene="SSC185"  
   /codon\_start=2  
   /product="olfactory receptor"  
   /translation="VAICYPLHYTAIMREGLCAFLVAWSWIPSCASSLSHTLLTPLS  
     FCDANTVHHYFCDLAALLKLSCSDIFLNELVMTVGVVVITLPFMCLVSYGYTGATI  
     LRVPSTKGIRKALSMCGSRLSVVSLYYGSIFGQYLFPVTSSSIDKDVIVALMYTVVTP  
   ML" (SEQ ID NO:333).  
 10  
 BASE COUNT 89 a 142 c 106 g 151 t  
 ORIGIN  
   1 tggccata tggaccctc tccactacac tgccatcatg agggaaaggc tctgtgcctt  
   61 cttagtggt gtatcttggaa ttccatcttg tgctagctcc ctcttcaca ccctctgt  
 15 121 gaccccgctg ctttctgtg atgcaaacac cgccacac tacttctgtg acctgtctg  
   181 cctgtcaag ctgtccgtc cagatatctt cctcaacgg ctggcatgt tcacagtgg  
   241 ggtgggttc attaccctgc cattcatgtg tattctggta tcataatggct acactgggc  
   301 cactatctg agggccctt caaccaaagg gatccgcaaa gcgttgtcca tggccatgt  
   361 ccgtctctt ggggtgttc tgattatgg ctaaatattt gggcagtacc tttcccaac  
 20 421 tgtaaggcgt tccattgaca aggatgtcat tggctcta atgtacacag tggcacacc  
   481 catgtgt (SEQ ID NO:332).

## OR204

25 LOCUS AF179825 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Saimiri sciureus olfactory receptor (SSC186) gene, partial cds.  
 ACCESSION AF179825  
 KEYWORDS .  
 SOURCE common squirrel monkey.  
 30 ORGANISM Saimiri sciureus  
   Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
   Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 35 TITLE The olfactory receptor gene repertoire in primates and mouse:  
   Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 40 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
   1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
   source 1..487  
 45   /organism="Saimiri sciureus"  
   /db\_xref="taxon:9521"  
   gene <1..>487  
   /gene="SSC186"  
   CDS <1..>487  
 50   /gene="SSC186"  
   /codon\_start=2  
   /product="olfactory receptor"  
   /translation="VATCHPLRYMVIMNPCLCSLLILLSPLTSVNALLSLMVLRLS  
     FCTDLEIPLFFCELAQVIQLACSDTLINNILIYFAACIFGGVPLSGIIFSQAQIASSI  
     LRMPSARRKYKAFSTCGSHLSMVLFYRTGLGVYISSAVTDSRKTAVASMMYSVGPQ

MV" (SEQ ID NO:335).

BASE COUNT 92 a 126 c 105 g 164 t

ORIGIN

5 1 tgtggccact tgtcaccccc tttagatacat ggtcatcatg aaccctgccc tctgcagcc  
61 gctgattttt ctttctccgt tgactagcgt tggatgcc ctcttcctca gcctgtatgg  
121 gttgaggcgt tccttcgtca cagatctgg aatcccgctc ttcttcgtg aactggctca  
181 ggtcatccag ctggctgtt ctgacacccat catcaataac atccatgtat attttgcagg  
241 ttgcataattt gggtgttc ctctgttgg aatcatattc tcttatgctc agatggc  
301 ctctatttt agaatgccat cagcacgcag aaagtataaa gcctttcca ctgtgggtc  
361 tcacctctcc atgggtctct tggtttagat gacaggtttgggggttaca ttgttctc  
421 agttactgac tcaccttagga agactgeagt ggctcaatg atgtattctg tgggtctca  
481 aatggtg (SEQ ID NO:334).

## OR205

15

LOCUS AF179826 487 bp DNA PRI 31-DEC-2000  
DEFINITION Saimiri sciureus olfactory receptor (SSC187) gene, partial cds.

ACCESSION AF179826

KEYWORDS

20 SOURCE common squirrel monkey.

ORGANISM Saimiri sciureus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 487)

25 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

30 AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

35 source 1..487

/organism="Saimiri sciureus"

/db\_xref="taxon:9521"

gene <1..>487

/gene="SSC187"

40 CDS <1..>487

/gene="SSC187"

/codon\_start=2

/product="olfactory receptor"

/translation="VAICLPLHYATIMSPMLSRLVALSWVLTTFHAMLHTLLMARLR

45

FCADNVILHFFCDMSALLKLACSDTRVNELVIFIMGGLILVIPFLLIIGSYARIVFSI

LKVPSKGICKAVSTCGSHLSVVSFYGTIVIGLYLCPSANNSTLKETVMAVMYTVMAP

ML" (SEQ ID NO:337).

BASE COUNT 84 a 140 c 104 g 159 t

ORIGIN

50

1 cggtggccatc tgcctccccc tacattacgc caccatcatg agccccatgc tgcgtcgctc

61 cctgggtggc ctgtcctggg tgctgaccac ctccatgcc atgtgcaca cttaactcat

121 ggccaggttg ctttttttgtc cagacaatgt gatccatccat tttttctgtg atatgtctgc

181 tctgtcttgg ctggcctgtc ctgacactcg agttaatggat ttgggtatat ttatcatggg

241 aggcccttattt ctgtcatcc catttctact tatcattggg tccatcgac gaattgtctt

55

301 ctccatccatc aaggccctt ctgtcttggg tatctgtcaag gccgtctca ctgtggctc

361 ccacctctcgtgggtcacatgttctatgg gactgttatt ggtctctact tatgccatc  
421 agctaataat tctactctaa aggagactgt catggctgtg atgtacactg tgatggcccc  
481 catgtcg (SEQ ID NO:336).

## 5 OR206

LOCUS AF179827 487 bp DNA PRI 31-DEC-2000  
DEFINITION Saimiri sciureus olfactory receptor (SSC190) gene, partial cds.  
ACCESSION AF179827

10 KEYWORDS

SOURCE common squirrel monkey.

ORGANISM Saimiri sciureus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

15 REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

20 REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

25 FEATURES Location/Qualifiers

source 1..487

/organism="Saimiri sciureus"

/db\_xref="taxon:9521"

gene <1..>487

/gene="SSC190"

CDS <1..>487

/gene="SSC190"

/codon\_start=2

/product="olfactory receptor"

35 /translation="VAICKPLHYTTIMSSKICLQLVLGCWVLGFLIFPPLLLGLNLD

FCASNVDHFYFDTIPLLQISCTDTQLLERMGFISALVTLLVTLVMVIISYTYIALTI

LKIPSTSQRKAFSTCSSHMIVISLSYGSCLFMYVKPSVKQRVSFSKGIVLNTEAP  
LL" (SEQ ID NO:339).

BASE COUNT 112 a 124 c 91 g 160 t

40 ORIGIN

1 tgtggccatc tgtaaggcccc tgcattacac caccatcatg agcagcaaaa tctgcctgca

61 gcttgtcgtt ggggtgcgtgg ttcttggttt ttcatcatc ttccacac tccttttagg

121 actaaatctt gacttctgtg cttccaacgt cgtgtatcat ttctactttg acactatccc

181 gtcctgtcag atttccatgtca cagacacgcga gtcctgtggag aggtatggat tcatctcagc

241 gtgttgtaca ctctatgtca caattggataat ggtgtataata tcataactat atatgtccct

301 gacaattctt aaaatccctt caactatgtca gaggaaaaag gctttttcca cgtgttcttc

361 tcacatgatt gtgtatcc ttcttatgg cagctgcata tcataatgtat ttaagccatc

421 agtcaaaccaa agggtatctt ttcaaaggaa aatttcgggtg ctcaataacct ctgtgtcc

481 acttttg (SEQ ID NO:338).

50

## OR207

LOCUS AF179828 485 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri sciureus olfactory receptor (SSC191) gene, partial cds.

55 ACCESSION AF179828

KEYWORDS .

SOURCE common squirrel monkey.

ORGANISM Saimiri sciureus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

5 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 485)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

10 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 485)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

15 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..485

/organism="Saimiri sciureus"

/db\_xref="taxon:9521"

20 gene <1..>485

/gene="SSC191"

CDS <1..>485

/gene="SSC191"

/codon\_start=1

25 /product="olfactory receptor"

/translation="VAICHPLQYSVIMTTGCGQLVAFSYMSGFMISVIKVYFISHVA

FCGSVMNHFCDISPVLKACKDMSTAELVDFALAVILVIPLITLISYIYIVSAI

LHIPSTQGRKKAFTSCASHLTVVIFYTAMIFTYVRPRAIASFNSNKMSAVYAVLTP

ML" (SEQ ID NO:341).

30 BASE COUNT 111 a 134 c 80 g 160 t

ORIGIN

1 gtggccattt gccaccctct tcaatactca gtcatcatga ccacaggta ctgtggacag

61 ctgggtggctt tctttatcat gagtggtttc atgatctgt tcataaggt ctatttcatt

121 tcacatgtt ctttctgtgg ctccaatgtt atgaaccact tttctgtga tatctcacca

35 181 gtcctaaac tggcatgcaa agacatgtc acagctgagc tagtgactt tgcttttagct

241 atcgtcattc ttgtgatccc ttcattacc actatctct cctatatacta cattgtctcc

301 gccattctgc atataccctc cacccaggaa aggaagaagg cttctccac ctgtgcattct

361 cacctcaact tagtcataat tttttacaca gccatgattt ttacatatgt tcggcccaga

421 gctattgcat catttaattc caacaaacta atgtcagctg tgtatgcagt cttcacaccc

40 481 atgct (SEQ ID NO:340).

## OR208

LOCUS AF179829 487 bp DNA PRI 31-DEC-2000

45 DEFINITION Saimiri sciureus olfactory receptor (SSC192) gene, partial cds.

ACCESSION AF179829

KEYWORDS .

SOURCE common squirrel monkey.

ORGANISM Saimiri sciureus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;

50 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

55 Evidence for reduction of function in primates

JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 5 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..487  
         /organism="Saimiri sciureus"  
 10     /db\_xref="taxon:9521"  
     gene <1..>487  
         /gene="SSC192"  
     CDS <1..>487  
         /gene="SSC192"  
 15     /codon\_start=2  
         /product="olfactory receptor"  
         /translation="VAICYPLHYTAIMREGLCAFLVAWSWIPSCASSLSHTLLTPLS  
             FCDANTVHFFCDLAALLKLSCSDIFLNELVMFTVGVVITLPFMICILVSYGYTGATI  
             LRVPSTKGIRKALSMCGSRLSVSLYGSIFGQYLFPVTSSSIDKDVIVALMYTVVTP  
 20     ML" (SEQ ID NO:343).  
 BASE COUNT 88 a 141 c 106 g 152 t  
 ORIGIN  
     1 tgttgccata tgtaaccctc tccactacac tgccatcatg agggaaaggcc tcgtgcctt  
     61 cttagtggt gtatctggta ttccatctg tgcttagctcc ctctctcaca ccctctgtct  
 25     121 gaccccgctg tcttcgttg atgcaaacac cgtccaccac ttcttcgttg accttgctgc  
     181 cctgtcaag ctgtccgtct cagatatctt cctcaatggat ctggcatgt tcacagtagg  
     241 ggttgtggc attaccctgc cattcatgtg tatcctggta tcatatggct acactggggc  
     301 caactatctg agggccctt caaccaaagg gatccgcaaa gcgttgtcca tgggtggctc  
     361 ccgtctctctt gtgggtctc tgtattatgg ctaaatattt gggcagtacc tttccccac  
 30     421 tctaaggcgt tccattgaca aggatgtcat tgtggctcta atgtacacag tggcacacc  
     481 catgtctg (SEQ ID NO:342).

## OR209

35 LOCUS AF179830 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Saimiri sciureus olfactory receptor (SSC193) gene, partial cds.  
 ACCESSION AF179830  
 KEYWORDS .  
 SOURCE common squirrel monkey.  
 40 ORGANISM Saimiri sciureus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 45 TITLE The olfactory receptor gene repertoire in primates and mouse:  
     Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 50 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
     1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
     source 1..487  
 55     /organism="Saimiri sciureus"

gene /db\_xref="taxon:9521"  
 gene <1..>487  
 gene="SSC193"  
 CDS <1..>487  
 gene="SSC193"  
 codon\_start=2  
 product="olfactory receptor"  
 translation="VAICYPLHYTAIMREGLC AFLVA VSWIPSCASSLSHTLLT PLS  
 FCDANTVHFFCDLA ALLKLSCSDIFLNE LVMTVGVVVITLPFM CILV SYGYTGATI  
 LRPVSTKGIRKALSMCGSRLSVVSLYYGSIFGQYLFPTVSSIDKD VIVALTYTVVTP  
 ML" (SEQ ID NO:345).  
 BASE COUNT 88 a 143 c 106 g 150 t  
 ORIGIN  
 1 ttttgcata ttttaccctc tccactacac tgccatcatg agggaaaggc tctgtgcctt  
 61 cttagtggct gtatcttggta ttccatcttg tgcttagctcc ctcttcaca cccttcgtct  
 121 gaccccgctg ctttctgtg atgcaa acac cgtccaccac ttcttcgtg accttgtgc  
 181 cttgtcaag ctgtcctgtc cagatatctt cctcaatggatgg ctggatgtt acatgttgg  
 241 ggttgtggc attaccctgc cattcatgtg tttccatggta tcatatggct acactgggc  
 301 caccatctgtt agggccctt caaccaagg gatccgcaaa gctgtgtcca ttttgtggctc  
 361 ccgtctctctt ttttgttgc ttttattatgg cttcaatattt gggcagtacc ttttcccaac  
 421 tttttttttt tttttttttt tttttttttt tttttttttt tttttttttt tttttttttt  
 481 catgtgtt (SEQ ID NO:344).

## OR210

LOCUS AF179831 486 bp DNA PRI 31-DEC-2000  
 DEFINITION Saimiri sciureus olfactory receptor (SSC194) gene, partial cds.  
 ACCESSION AF179831  
 KEYWORDS  
 SOURCE common squirrel monkey.  
 ORGANISM Saimiri sciureus  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 486)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..486  
 /organism="Saimiri sciureus"  
 /db\_xref="taxon:9521"  
 gene <1..>486  
 gene="SSC194"  
 CDS <1..>486  
 gene="SSC194"  
 codon\_start=2  
 product="olfactory receptor"  
 translation="VAICHPLHYVTINPRLCGLLVLASWILSALNSSLQTLIVLRLS  
 FCTDLEIPHFFCELNQVIHLACYDTFLNDVVMYLAAMLLGGGPLTGIYSYSKIVSSI

RAISSAQGKYKAFSTCASHILIVSLFYGTLLGVYISSAATGNSHSSAAALVMYTVVTP  
ML" (SEQ ID NO:347).

BASE COUNT 102 a 133 c 97 g 154 t

ORIGIN

5 1 tgtggccatc tgtacccccc tgcaactacac agtcaccatt aaccccccagac tgtgtggact  
61 gctggttctg geatccctgga tcctgagtgc cctgaattcc tcattacaaa ccttaatagt  
121 gctcgccctt tccttcgtca cagacttgaa aatccccccat ttttctcg aacttaatca  
181 ggtcatacat ctggcctgtt atgacactt ccctaattgtat ggggtatgt atttggcagg  
241 tatgtctgtt ggccgggtgc ccctcacagg aattttatc tcttactcta agatagttc  
10 301 ctccatactg gcaatctcat cagctcaggg gaagttacaag gctgttcca cctgtgcatt  
361 tcacatcttta attttgttgg tacactctta ggtgttaca ttgttctgc  
421 tgcaactgge aactcacatt caagtgtgc agccttgggt atgtacactg tggcacc  
481 catgt (SEQ ID NO:346).

15 OR211

LOCUS AF179832 487 bp DNA PRI 31-DEC-2000  
DEFINITION Saimiri sciureus olfactory receptor (SSC195) gene, partial cds.

ACCESSION AF179832

20 KEYWORDS

SOURCE common squirrel monkey.

ORGANISM Saimiri sciureus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

25 REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

30 REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

35 FEATURES Location/Qualifiers

source 1..487

/organism="Saimiri sciureus"

/db\_xref="taxon:9521"

gene <1..>487

/gene="SSC195"

CDS <1..>487

/gene="SSC195"

/codon\_start=2

/product="olfactory receptor"

45 /translation="VAICNPLL YMVTMSPQVCLL LGVYGMGV LGAVA HMGNIM FMT

FCSEN LVNH YMCDVL PLEL SCNS YYIN LLLV FIIVAIGIGVPI VTIFIS YGFILSSI

LHISSTEGRSKAFSTCSSHI IVVSLFFGSGAF MYLKPPSILPLDQGVSSIFYTA VVP

MF" (SEQ ID NO:349).

BASE COUNT 92 a 116 c 105 g 174 t

50 ORIGIN

1 cgtagccatc tgtaacccac tgctgtacat ggtcaccatg tctcccccagg tgtgttgc

61 ccttttgtt ggtgtctatg ggatgggggtt tttggggctt gtggctata tggaaacat

121 aatgtttatg accttttgtt cagaaaaatctt tgtaatcac tacatgttg atgttcc

181 ctcctttagt ctcttcgtca acagcttta cataaatttg ctgtgtttt ttatattgt

55 241 ggccattggc attggggtgc caattgtcac cattttatc tctttatgtt ttatcttc

301 cagcattctc cacattagct ccacagaggg caggctaaa gccttcgta cctgcagtc  
361 ccacataatt gtggtatcgc tttcttgg gtcaggagct ttatgtacc tcaaaccacc  
421 ttctattcta cccctggacc aggggaaagt gcttccatt tttatactg cagtgggcc  
481 catgtt (SEQ ID NO:348).

5

## OR212

LOCUS AF179833 486 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri boliviensis SBO213 pseudogene, partial sequence.

10 ACCESSION AF179833

KEYWORDS

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
15 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

20 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 486)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

25 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..486  
/organism="Saimiri boliviensis"  
/db\_xref="taxon:27679"

30 gene <1..>486

/gene="SBO213"  
/pseudo

BASE COUNT 107 a 151 c 87 g 141 t

ORIGIN

35 1 cgtggccatc tgccaccctc tccactatcc catccgcattt agtagaaatgt ttttgttggaa  
61 gatgatttggaa ggctcttggaa cgctggggtc catcaactcc ttggcacaca cagtctatgc  
121 cttccatattt ccttacttgc ggtcttagatc cattgaccat ttcttcttgcc acatcccagg  
181 catgttgcgtt ctgcgttgcgaa cggacacttg ggtctatgaa tacatggttt ttcttaatgtac  
241 aagctgcctt ctcccttttc ttcccttggc atcaccgtt cctatggccg agtctattt  
40 301 gctgttacc atacgcattt aaaaaaggaa agaaaaagg cttccaccac catttcaacc  
361 catttaactt tagtgcattt ttactatgc cctttgtctt acacccatct tcggccagg  
421 aatctccactt caccatccga agacaagatc ctggcagtctt tctacaccat ctttaccctt  
481 atgttc (SEQ ID NO:350).

45

## OR213

LOCUS AF179834 487 bp DNA PRI 31-DEC-2000

DEFINITION Saimiri boliviensis olfactory receptor (SBO214) gene, partial cds.

ACCESSION AF179834

50 KEYWORDS

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

55 REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
5 JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
10 FEATURES Location/Qualifiers  
source 1..487  
/organism="Saimiri boliviensis"  
/db\_xref="taxon:27679"  
gene <1..>487  
15 /gene="SBO214"  
CDS <1..>487  
/gene="SBO214"  
/codon\_start=2  
/product="olfactory receptor"  
20 /translation="VAICKPLHYTTIMSSKICLQLVLGCWVLGFLIIFPPLLLGLNLD  
FCASNVDHFYCDTIPLLQISCTDTQLLERMGFISALVTLLVTLVMVIISYTYIALTI  
LKIPSTSQRKKAFSTCSSHMIVISLSYGSCLFMYVKPSVKQRVSFSKGIVLNTSVAP  
LL" (SEQ ID NO:352).

25 BASE COUNT 112 a 125 c 92 g 158 t

ORIGIN

1 tgtggccatc tgtaagcccc tgcattacac caccatcatg agcagcaaaa tctgcctgca  
61 gctttgtctt ggggtctggg ttcttggtt ttcatacatc ttccacac tccttttagg  
121 actaaatctt gacttctgtg cctccaacgt cgtgtatc ttctactgtg acataatccc  
181 gtcctgtcag atttcctgca cagacacgcga gtcctggag aggatggat tcatctcagc  
241 gctgggtaca ctctttagtca cattggtaat gggtataata tcatatactt atattggccct  
301 gacaattcta aaaatccctt caactagtca gaggaaaaag gctttttcccg tgggttcttc  
361 tcacatgatt gtgatatccc ttctttatgg cagctgcac ttcatgtatg ttaagccatc  
421 agtcaaacaa agggttatctt ttcaaaaggg aatttcggtg ctcaataacctt ctgtgtcc  
481 acttttg (SEQ ID NO:351).

35

## OR214

LOCUS AF179835 487 bp DNA PRI 31-DEC-2000  
DEFINITION Saimiri boliviensis olfactory receptor (SBO215) gene, partial cds.

40 ACCESSION AF179835

KEYWORDS

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

45 REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

50 JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR

55 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

	FEATURES	Location/Qualifiers
	source	1..487
		/organism="Saimiri boliviensis"
		/db_xref="taxon:27679"
5	gene	<1..>487
		/gene="SBO215"
	CDS	<1..>487
		/gene="SBO215"
		/codon_start=2
10		/product="olfactory receptor"
		/translation="VAICFPLHYTLLMSHISCVNTVIVCWSISIAGALIYTVFTLHLP
		YCGPYKINHFFCEVPVLKLACADTSFNDRLDFILGFLLLVLPLSFILASYVLIFASI
		FRIRSVQGRFLKSFSTCAHVTVVTMFYGPAIMYMRPGSWYDPEWDKKVEVLYNVISA
		FL" (SEQ ID NO:354).
15	BASE COUNT	86 a 142 c 104 g 155 t
	ORIGIN	
		1 cgttgcatt tgctcccccc ttcaactatac gctactcatg agccattcca ttgtgtcaa
		61 cacggcatt gtctgttgtt ccattagcat agctggggcc ctgtatcaca ctgtttcac
		121 ctgtcatctg ctttatgtg gcccctacaa gataaaccac ttcttcgtg aggtccctgc
20		181 tgcctcgaag ttggcctgtg cagacacatc tttaatgac aggctggact tcattttggg
		241 tttccctctg cttttgtcc cacttcctt catcctggcc ttcttacgtac tcattttgc
		301 ctctatctc agaatccgtc cagtgcaggg gaggctcaag ttcttctcca cgtgtgttc
		361 ccacgtcaact gtggtcacca tggctacgg accggccatc atcatgtaca tgaggcccg
		421 ttcttggtat gacccagagt gggacaagaa ggttagaggtg ttgtacaatg tcatttcgtc
25		481 ctcttg (SEQ ID NO:353).

## OR215

	LOCUS	AF179836	487 bp	DNA	PRI	31-DEC-2000	
30	DEFINITION	Saimiri boliviensis olfactory receptor (SBO216) gene, partial cds.					
	ACCESSION	AF179836					
	KEYWORDS						
	SOURCE	Bolivian squirrel monkey.					
	ORGANISM	Saimiri boliviensis					
35		Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;					
		Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.					
	REFERENCE	1 (bases 1 to 487)					
	AUTHORS	Giorgi,D.G. and Rouquier,S.P.					
	TITLE	The olfactory receptor gene repertoire in primates and mouse:					
40		Evidence for reduction of function in primates					
	JOURNAL	Unpublished					
	REFERENCE	2 (bases 1 to 487)					
	AUTHORS	Giorgi,D.G. and Rouquier,S.P.					
	TITLE	Direct Submission					
45	JOURNAL	Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR 1142, rue de la Cardinolle, Montpellier Cedex 5 34396, France					
	FEATURES	Location/Qualifiers					
	source	1..487					
		/organism="Saimiri boliviensis"					
		/db_xref="taxon:27679"					
50	gene	<1..>487					
		/gene="SBO216"					
	CDS	<1..>487					
		/gene="SBO216"					
55		/codon_start=2					

5 /product="olfactory receptor"  
 /translation="VAICQPLHYSTLLSPQACMTMVGTSWLTGIIATTHASLIFSLP  
 FPSHPMPHFLCDILPVRLASAGKHRSEISVMTATVVFIMVPFSMIVTSYIRILGAI  
 LAMTSTQSRHKVFSTCSSHLLVVCLFFGTASITYIRPQAGSSVTTDRILSLFYTVITP  
 ML" (SEQ ID NO:356).  
 BASE COUNT 93 a 186 c 89 g 119 t  
 ORIGIN  
 10 1 tgtggccatc tgccagcccc tgcactactc cacccttgc agccccacagg cctgcac  
 61 catggggc accttcgtgc tcacaggcat catcacagcc accacccatg cctccctcat  
 121 ctctctctg ccctccccca gccacccaat gatcccacac ttctctgtg acatccgtcc  
 181 agtaactgaga ctggcaagtctggaaagca caggaggtag atctccgtga tgacageta  
 241 cttcttc atcatggtcc ctctcttat gattgtcacc ttctacatcc gcatcctggg  
 301 tgccatcttca gcaatgactt ccacccagag ccgcacaaag gtctcttcca cctgcctc  
 361 ccatctgtt gtggctgtc ttcttttgtt aacagccagc atcacctaca taegccccca  
 421 ggcaggctcc tctgtcacca cagaccgcat ctcgtctc ttctacacgg tcatcacacc  
 481 catgttc (SEQ ID NO:355).

## OR216

20 LOCUS AF179837 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Saimiri boliviensis olfactory receptor (SBO217) gene, partial cds.  
 ACCESSION AF179837  
 KEYWORDS  
 SOURCE Bolivian squirrel monkey.  
 25 ORGANISM Saimiri boliviensis  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 30 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 35 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..487  
 40 /organism="Saimiri boliviensis"  
 /db\_xref="taxon:27679"  
 gene <1..>487  
 /gene="SBO217"  
 CDS <1..>487  
 45 /gene="SBO217"  
 /codon\_start=2  
 /product="olfactory receptor"  
 /translation="VAICHPLYYSTVMSPQVCALILVLCWVLNVVALTHTLMARLS  
 FCVTGEIAHFFCDITPVKLSCSDTHINEMMVVLGGTVLIIPFLCIVTSYIYIVPAI  
 50 LRVTHRGGAGKAFSTCSSHLCIVCFYGTLFSAYLCPPSIASEDKDIATAAMYTIVTP  
 TL" (SEQ ID NO:358).  
 BASE COUNT 89 a 151 c 100 g 147 t  
 ORIGIN  
 119 1 tgtggccatt tgccaccccc tctactactc cacagtcatg agcccccaag tctgtgccct  
 61 aatccctgtt ttgtgtggg tcctcacca cgttgtgcc ttgacccaca cactccat



LOCUS AF179839 487 bp DNA PRI 31-DEC-2000  
DEFINITION Saimiri boliviensis olfactory receptor (SBO219) gene, partial cds.  
ACCESSION AF179839  
5 KEYWORDS .  
SOURCE Bolivian squirrel monkey.  
ORGANISM Saimiri boliviensis  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
10 REFERENCE 1 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
JOURNAL Unpublished  
15 REFERENCE 2 (bases 1 to 487)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
20 FEATURES Location/Qualifiers  
source 1..487  
/organism="Saimiri boliviensis"  
/db\_xref="taxon:27679"  
gene <1..>487  
25 /gene="SBO219"  
CDS <1..>487  
/gene="SBO219"  
/codon\_start=2  
/product="olfactory receptor"  
30 /translation="VAICHPLQYSVIMTTGCGQLVAFSYMSGFMISVIKVYFISHVA  
FCGSNVNMNLFFCDISPVLKLAACKDMSTAELVDFALAIIVLVIPLITIILSYIYIVSAI  
LHIPSTQGRKKAFSTCASHLTVVIFYTAMIFTYVRPRAIASFNSNKLISAVYAVLTP  
ML" (SEQ ID NO:362).  
35 BASE COUNT 111 a 136 c 78 g 162 t  
ORIGIN  
1 tgtggccatt tgccaccctc ttcaatactc agtcatcatg accacagggtt acttgtggaca  
61 gctgggtggct ttcttttaca tgagtgggtt catgtatctc gtcataagg tctatttcatt  
121 ttccatgtt gctttctgtg gtcataatgt tatgaacctc tttttctgtt atatctcacc  
181 agtcctaaaa ctggcatgca aagacatgtc cacagcttagt ctatggact ttgcatttagc  
40 241 tatcgatcatt ctgtgtatcc ctctcatttca cactatccctc tccttatatct acattgtctc  
301 cgccattctg catataccctt ccacccagg aaggaaagaag gccttcctca cctgtgcattc  
361 tcacctcaat gtatgtatcc ttttttacac agccatgattttatcatgtt tcggccccag  
421 agctattgca tcatttaattt ccaacaaactt aatctcagctt gtctatgcag tcctcacacc  
481 catgtca (SEQ ID NO:361).

## 45 OR219

LOCUS AF179840 488 bp DNA PRI 31-DEC-2000  
DEFINITION Saimiri boliviensis SBO220 pseudogene, partial sequence.  
50 ACCESSION AF179840  
KEYWORDS .  
SOURCE Bolivian squirrel monkey.  
ORGANISM Saimiri boliviensis  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
55

REFERENCE 1 (bases 1 to 488)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates  
5 JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 488)  
AUTHORS Giorgi,D.G. and Rouquier,S.P.  
TITLE Direct Submission  
JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
10 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
FEATURES Location/Qualifiers  
source 1..488  
/organism="Saimiri boliviensis"  
/db\_xref="taxon:27679"  
15 gene <1..>488  
/gene="SBO220"  
/pseudo  
BASE COUNT 112 a 126 c 92 g 158 t  
ORIGIN  
20 1 tgtggccatc tgtaagecccc tgcattacac caccatcatg agcagcaaaa tctgcctgca  
61 gcttgcgtt ggggtgctggg ttcttggttt tcicatcatc ttccaccac tcctcttagg  
121 actaaatctt gacttctgtg cctccaaacgt cgttgtatc ttctactgtg acactatccc  
181 gtcctcgag atttcgtca cagacacgcga gtcctggag aggatggat tcatactcagc  
241 gctggtgaca ctcttagtca cattggtaat ggtgataata tcataatactt atatggccct  
25 301 gacaattcta aaaatccctt caactagtca gaggaaaaag gcttttcca cgttgttcc  
361 tcacatgatt gtgatatccc ttcttatgg cagctgccat ctctcatgtat gtaagccat  
421 cagtcaaaca aagggtatct tttcaaaagg gaatttcggg gctcaataacc tctgttgctc  
481 cacttttg (SEQ ID NO:363).

30 **OR220**

LOCUS AF179841 487 bp DNA PRI 31-DEC-2000  
DEFINITION Saimiri boliviensis olfactory receptor (SBO221) gene, partial cds.

ACCESSION AF179841

35 KEYWORDS .

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

40 REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:  
Evidence for reduction of function in primates

JOURNAL Unpublished

45 REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

50 FEATURES Location/Qualifiers

source 1..487  
/organism="Saimiri boliviensis"  
/db\_xref="taxon:27679"

gene <1..>487  
/gene="SBO221"

55

CDS <1..>487  
 /gene="SBO221"  
 /codon\_start=2  
 /product="olfactory receptor"  
 5 /translation="VAICLPLHYATIMSPMLSRSVLASWVLTTFHAMLHTLLIARLR  
 FCADNVIFHFFCDMSALLKLACSDTRVNELVIFIMGGLILVIPFLLIIGSYARIVFSI  
 LKVPSKGICKAVSTCGSHLSVSVLFYGTIVIGLYLCPSANNSTLKETVMAVMYTVMAP  
 ML" (SEQ ID NO:365).  
 BASE COUNT 85 a 139 c 103 g 160 t  
 10 ORIGIN  
 1 cgtggccatc tgccctcccc tacattacgc caccatcatg agccccatgc tgtctcgctc  
 61 cctgggtggcg ctgtccctgg tgctgaccac cttecatgcc atgttgacaca ctttactcat  
 121 agccagggtt cgtttttgtc cagacaatgt gatcttccac ttttctgtg atatgtctgc  
 181 tctgctgaag ctggccctgc ctgacactcg agttaatgaa ttggtgatata ttagatggg  
 15 241 aggccttcatt ctgticatcc catttctact tatcatggg tcctacgcac gaattgtctt  
 301 ctccatctc aaggcccctt ctcttaagggg tatctgcaag gccgtctcta ctgtggctc  
 361 ccacccctctt gtgggtgtcac tggctatgg gactgttatt ggctctact tatgcccattc  
 421 agctaataat tctactctaa aggagactgt catggctgtg atgtacactg tgatggcccc  
 481 catgctg (SEQ ID NO:364).  
 20

### OR221

LOCUS AF179842 487 bp DNA PRI 31-DEC-2000  
 DEFINITION Saimiri boliviensis olfactory receptor (SBO222) gene, partial cds.  
 25 ACCESSION AF179842  
 KEYWORDS  
 SOURCE Bolivian squirrel monkey.  
 ORGANISM Saimiri boliviensis  
 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
 30 Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.  
 REFERENCE 1 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE The olfactory receptor gene repertoire in primates and mouse:  
 Evidence for reduction of function in primates  
 35 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 487)  
 AUTHORS Giorgi,D.G. and Rouquier,S.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
 40 1142, rue de la Cardonille, Montpellier Cedex 5 34396, France  
 FEATURES Location/Qualifiers  
 source 1..487  
 /organism="Saimiri boliviensis"  
 /db\_xref="taxon:27679"  
 45 gene <1..>487  
 /gene="SBO222"  
 CDS <1..>487  
 /gene="SBO222"  
 /codon\_start=2  
 50 /product="olfactory receptor"  
 /translation="VAICNPLLYMVTMSPQVCLLLLLGVYGMGVLAVALHTGNIVFLT  
 FCAGNLVNHYMCDILPILLESCNGSYINVLVIFIVVTIGIVPIVAIFISYGFILSSN  
 LHISSAEGRSKAFSTCSSHIIAVSLFFGSGAFMYLKPSVLPLDQGVSSLFYTIVVP  
 MF" (SEQ ID NO:367).  
 55 BASE COUNT 86 a 120 c 105 g 176 t

ORIGIN

1 cgtggccatc tctaaccac tgctgtacat ggtcaccatg tctccccagg tgggttgct  
61 ccttttgtg ggtgtatg ggatgggggt ttgggggct gtggctata cagaaatat  
121 agtggttctta accttttgtg caggcaacct tgtcaatcac tacatgtgtg acatcctcc  
5 181 ccttccttag ctctctgca atggctctta cataaatgtt ctggcatct ttatgttgt  
241 gaccattggc attgggggtc ccattgtgc catttttatc tcttatggtt ttatcttc  
301 cagaatctc cacattgtt ctgctgaggg caggtctaaa gcctcagta cctgcagtc  
361 ccacataatt gcagtttc tttcttcgg gtcaggagct ttatgtacc tcaaaccctc  
421 ttccgttta cccctggacc agggaaagt atcctccctg ttttatacta ttgtgggcc  
10 481 catgtt (SEQ ID NO:366).

**OR222**

LOCUS AF179843 487 bp DNA PRI 31-DEC-2000

15 DEFINITION Saimiri boliviensis olfactory receptor (SBO223) gene, partial cds.

ACCESSION AF179843

KEYWORDS

SOURCE Bolivian squirrel monkey.

ORGANISM Saimiri boliviensis

20 Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Primates; Platyrrhini; Cebidae; Cebinae; Saimiri.

REFERENCE 1 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE The olfactory receptor gene repertoire in primates and mouse:

25 Evidence for reduction of function in primates

JOURNAL Unpublished

REFERENCE 2 (bases 1 to 487)

AUTHORS Giorgi,D.G. and Rouquier,S.P.

TITLE Direct Submission

30 JOURNAL Submitted (24-AUG-1999) Institut de Genetique Humaine, CNRS, UPR  
1142, rue de la Cardonille, Montpellier Cedex 5 34396, France

FEATURES Location/Qualifiers

source 1..487

/organism="Saimiri boliviensis"

35 /db\_xref="taxon:27679"

gene <1..>487

/gene="SBO223"

CDS <1..>487

/gene="SBO223"

40 /codon\_start=2

/product="olfactory receptor"

/translation="VAICHPLHYTVTINPRLCGLLVASWILSALNSSLQTLIVLRLS

FCTDLEIPHFFCELNQVHLACYDTFLNDVVAMYLAAMLLGGGPLTGIIYSYSKIVSSI

RAISSAQGKYKAFSTCASHILIVSLFYGTLLGVYLSSAATGNSHSSAAALVMYTVVTP

45 ML" (SEQ ID NO:369).

BASE COUNT 101 a 134 c 98 g 154 t

ORIGIN

1 tgtggccatc tgcactacac agtcaccatt aaccccagac tgggtggact

61 gctgggtctg gcatccctgg a cttcgatgc cctgaatcc tcattacaa ccttaatag

50 121 gctggggctt tcctctgca cagacttgg aatccccac ttttctgcg aacttaatca

181 ggtcatacat cttggctgtt atgacacttt ctttaatgtat gttgtatgt atttggcagc

241 tatgctgtcg ggccgggtgc ccctcacagg aattttatc tcttactctc agatagttc

301 ctccatacgt gcaatctcat cagctcagg gaaatcacaag ggcgtttcca cctgtgcata

361 tcacatctta attgctcctt tttttatgg tacactctc ggtgtgtacc ttatgtctgc

421 tgcaactggc aactcacatt caagtgtgc agccctggtg atgtacactg tggccaccc

481 catgctg (SEQ ID NO:368).

## OR223

LOCUS AF073959 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR1-72M15 olfactory receptor gene,  
partial cds.  
ACCESSION AF073959  
KEYWORDS  
10 SOURCE western European house mouse.  
ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR1-72M15"  
mRNA <1..>649  
/product="olfactory receptor"  
30 CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
/product="olfactory receptor"  
/translation="IADIGFTSTIPKVLQTIHTQSKFISFGCITQIFFIVFGCLD  
NLLLSVMAYDRFVAICHPLHYVVIMNSCFVCVMLALGSWIVSVMSSLPETLTVRLSFC  
TNMEIPHFFCDLPVELKLACSDTLVNNIVTYSITIVIAGFPFSGILLSYSKIFSSILR  
IPSAGGKYKAFSTCGSHLLVVFLFYSNGLGVYLSSAATSSSRMSLVASLMYSIVTP" (SEQ ID  
35 NO:371).  
40 BASE COUNT 139 a 171 c 119 g 220 t  
ORIGIN  
1 catatgcac atcggctca cttccacac tatccccaaag gtctgcaga ctatccacac  
61 acagagcaa ttcatcttttcttcggcgtc catcacacag atattttctt tcatttgttt  
45 121 tggatgcctg gacaattttac ttctatcatgt gatggcctat gaccgcgttg tggccatctg  
181 ccatcccttg caactatgtgg tcatcatgaa ttcttgcttc tggtgtatgc tggctcttgg  
241 atcatggata gtcagcgta tgagttccctt accttgagacc ttgactgtgt taagactatc  
301 ttctctgtaca aacatggaaa ttccacactt ttctgtgtat ctcccgaaag tctctgaagct  
361 tgcctgttct gacacccttg ttaataacat tttgtacat tctataacca tagtcatagc  
40 421 tggtttccca ttctctggta ttctattgttc ttatctcaag attttctctt ccattcttaag  
481 aattccctca gctggggcga agtacaaagg cttttctacc ttgtgggttc atctttgggt  
541 ggtcttcta ttctatagca atggcttgg ggtctaccc agtctgcag ccacatcatc  
601 ttctagaatg agtcttagtgc cttctactgtat gtacacgata gtcactccc (SEQ ID NO:370).

## OR224

LOCUS AF073960 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR1-72M16 olfactory receptor gene,  
partial cds.  
ACCESSION AF073960  
KEYWORDS .  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR1-72M16"  
30 mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FSDFCFSSVTIPKLLQNMQSQVPSIYAGCLAQMYFPLLFADE  
SFLLVAMAYDRYVAICFPLHYTSIMSPKLCLCLVALSWLLTVISHTLLMARLSFC  
ANNVIPFFCDMSALLKLACSDIQINKLMIFILGGLVIIVPFLIFSSYARIVSSILK  
VPSSRSIRKAFTCGSHLSVVSLFYGTIIGLYLRLPSANNSTIKETVMAVMYTUVTVP" (SEQ ID  
40 NO:373).  
BASE COUNT 129 a 184 c 120 g 216 t  
ORIGIN  
1 ctctctgac ttctgcttt cctctgtgac cattccaaa ttgcgcaga acatgcaaag  
61 ccaagtcca tccataccct atgcagggtt cctggcacaat atgfactttt tccctgccttt  
45 121 tgcagacttc gagagctcc tccttgtggc catggctat gatcgctatg tgcccatctg  
181 ctcccccta cactatacta gcatcatgag ccccaagctg tgtctcgcc tggggact  
241 atctggcta ctgaccacag tcatctttt gtcacacaca ctgctcatgg ctggctctc  
301 ctctgtgtt aacaatgtga ttccctactt ttctgtgtat atgtcagctc ttctgaagtt  
361 agccctgcctt gacattcaga tcaataaggat gatgatattt atcttggggat gacttgcatt  
50 421 tattgtccca ttccctgctga tattttcata ctatgcacgaa atatgtgtctt ccatttcata  
481 ggtccccctt tcttagaagca tccgcaaggc ctctccacc tgggttccc acctctctgt  
541 ggtgtctttt ttctatggaa caatcatgg tctctatata cgatccatcag ctaataattc  
601 aaccattaag gagactgtca tggctgtat gtacacgggtt gtgaccctt (SEQ ID NO:372).

## OR225

LOCUS AF073961 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR10M olfactory receptor gene,  
partial cds.  
ACCESSION AF073961  
KEYWORDS .  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR10M"  
30 mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FSDLCFSSVTMPKLLQNMQSQDSSITYAGCLTQMYFFLLFGDLE  
SFLLVAMAYDRYVAICFPLHYMSIMSPSLCVSLVLLSWLTTFHAMLHTLLMARLSFC  
EDNVIPHFFCDMSALLLSCSDTHVNELVIFVTGGLILVIPFVLILVSYARIVSSILK  
VPSARGIRKAFTSTCGSHLSVSVSLFYGAIIGLYLCPSADNSTVKETVMAMMYTVVTP" (SEQ ID  
40 NO:375).  
BASE COUNT 120 a 185 c 141 g 203 t  
ORIGIN  
1 cttctctgtatcgtttt cctctgtcac aatgccccaa ttgtcgaga acatgcagag  
61 ccaggactca tcacatcaccc atgcaggatg cctgacacaa atgtactttt tcttgcttt  
45 121 tggagaccc gagagcttc tccttgtggc catggctat gaccgctatg tggccatctg  
181 ctccccccctt cattacatga gcatcatgag ccccagccctc tgtgtgagtc tggtgctgt  
241 gtcctgggtg ctgaccactt tccatgecat gctgcatacc ctgctcatgg ccagattgtc  
301 attctgttag gacaatgtta tcccccaactt ttctgtgac atgtctgtc tgcgtgaagct  
361 gtcctgtctt gacactcacg ttaatgaattt ggtgtatattt gtacaggag gctgtatcc  
50 421 tgtcatccca ttgtgtctca tccttgtgtc ctatgcacga atttgtgtctt ccattctcaa  
481 ggtcccgctt gtcgaggca tcggtaaaggc ctctccacc ttgtgggtccc acctgtctgt  
541 ggtgtactgtt tcctatgggg caatcatgg tctgtactta tgcctatcg ctgtataactc  
601 tactgtgaag gaaactgtca tggccatgtat gtaacacagtgt gtaactccc (SEQ ID NO:374).

## OR226

LOCUS AF073962 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION *Mus musculus domesticus* clone OR11M olfactory receptor gene,  
partial cds.  
ACCESSION AF073962  
KEYWORDS .  
SOURCE western European house mouse.  
10 ORGANISM *Mus musculus domesticus*  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR11M"  
30 mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FSDLCFSSVTMPKLLQNMQSQDPSIPYGGCLAQIFFFMLFGDME  
SFLLVAMAYDRYVAICFPLHYTSIMSPKVCTFLVLLWILTPHATMQILLTVRLSFC  
ENNVFLNFFCDIFVLLKLACSDTYVNDLMILIMGGLIIVIPFLLIVISYARIISSTLK  
VPSTQGIHKVFSTCGSHLSVVSFLFYGTIIGLYLCPSGNNSLKGSAMAMMYTVVTP" (SEQ ID  
40 NO:377).  
BASE COUNT 143 a 160 c 122 g 224 t  
ORIGIN  
1 ttctctgac ctctgcttt cctctgtcac aatgccaaa ttgctgcaga atatgcagag  
61 ccaggaccacca tccatccccat atggagggtt cctggcacaat atattcttctt ttatgccttt  
45 121 tggagacatg gaaagcttc ttcttgtagc catggcttat gaccgctatg tggccatctg  
181 cttccctctg cattacacta gcatcatgag tcctaagggtc tgtaactttc tagtgctact  
241 gtttgtggata ctgacaacac cacatgccc aatgcaaattt ctgctcacag taagactgtc  
301 ttttgtgag aacaatgtt ttctcaactt ttcttgtagc atatgttctc tcttaaagt  
361 ggcctgctca gacacttatg ttaatgattt gatgatactt atcatgggg ggctcatcat  
50 421 ttttattcca ttctgtctca ttcttatatc ctatgcaagg atcatcttctt ctactcttaa  
481 gtttccatct actcaaggca tccacaagggtt ctctctacc tttggctctc atctgtctgt  
541 gtttgccttg ttctatggga caattattgg tctctactta ttgtccatcg gtaataattt  
601 cagtcataaag gggctgcca tggctatgtt gtacacagtgtt gtgtactccc (SEQ ID NO:376).

## OR227

LOCUS AF073963 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR12M olfactory receptor gene,  
partial cds.  
ACCESSION AF073963  
KEYWORDS .  
10 SOURCE western European house mouse.  
ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR12M"  
mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FSDLCFSSVTMPKLLQNMQSQDTSISYAGCLTQMYFLLVFGDLE  
SILLLV MAYDRYVAVCFPLHYMSIMSPTLCVCLLVL SWVFTVLYSMLHTLLSRLSFC  
EDNLIHHFFCDISALLKLACSDIHINELMIFIMGLVSIIPFLIVVSYIQIVYSILK  
ISSAHVLHKIFSTCGSHLSVVSLFYGTIFALYLCPSANSTVKEISMAMMCTVVTP" (SEQ ID  
40 NO:379).  
BASE COUNT 134 a 159 c 122 g 234 t  
ORIGIN  
1 ctctctgtat ctctgccttt cctctgtcac aatgccaaag ttgttacaga acatgcagag  
61 ccaggacacg tccatctcct atgcgtggctg tctgacacaa atgtactttt tattggttt  
45 121 tggagacctg gagagcatcc ttcttttgtt catggctttt gaccggatgg tggctgtctg  
181 ctccccctt cattacatga gcatcatgag ccccacactc ttgtgtgttc tgctagtgtt  
241 atctgggtta ttactgtgc ttttttttat gtgcacact ctactctgtt cttagattgtc  
301 attctgttag gataacttga tccaccactt ttctgttgac atatctgcc tgcgtcaagg  
361 ggcttgcctt gacattcata ttaatgaattt aatgtatattt atcatgggg ggcttggtag  
421 catcatccca ttcttactca ttgttgtgtc ctatatacaa atttgttactt ccattctaaa  
481 gattcatctt gctcatgttt tacacaagat ttctccacc ttgtgggtccc acctgtctgt  
541 agtctcaactt ttctatggga caattttgc tctctactta ttgttgcacatcg ctaataactc  
601 tactgtgaag gagatttcca tggccatgtat gtgcacatgtt gtgactccc (SEQ ID NO:378).

## OR228

LOCUS AF073964 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR15-71M19 olfactory receptor gene,  
partial cds.  
ACCESSION AF073964  
KEYWORDS  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR15-71M19"  
30 mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FSDIGFISTTIPKMLVNIQTQSKSISYAE~~CITQIYFFMLFGGMD~~  
ILLLTVMAYDRFVAICHPLHYSVIMNPQLSGLLVLVSWFISFSYSLIQSLLMLRLSFC  
TNQIIKHFYCEYSRALTIACSDTLINHILLYYLICVLGFIPFGILYSYCKIVSSILR  
IPSTDGKYKAFSTCGSHLSVVSLFYGTGLGVYLSSDVTS~~SSGKDVVASVMYTVVTP~~" (SEQ ID  
40 NO:381).  
BASE COUNT 153 a 151 c 112 g 233 t  
ORIGIN  
1 ctttctgac attggtttca tccttacaac tattccctaag atgtggtga atatccaaac  
61 acagagcaag tccatctcct atgcagaatg catcacccag atttattttt tcatgcttt  
45 121 tggaggcatg gacatacttc tcctcaccgt gatggcttat gaccgatttg tggccatctg  
181 tcacccctt cactatttag tcattatgaa tccccacta agtggctgc tggctctgt  
241 atcatggttt attagctttt catattctct gatacagagt ctatgtatgc tgccgttgtc  
301 cttctgtaca aatcagataa ttaaacactt ttactgtgaa tattcttagag ccctactat  
361 agcctgctca gacacactaa tcaatcatat ccttcttat attctgtat gtgccttgg  
50 421 cttcatccc ttcctaggaa tcctttatc atactgtaaa attgtttctt ctattttag  
481 aattccatca acagatggaa aataataaagc attttctacc tggggcttc atctatcagt  
541 ggttctta ttctatggaa caggccttgg tggtaacctt agtctgtatg taacttcctc  
601 ctctggaaag gacgtggtgg cctcgtataat gtatacagt gtcacccct (SEQ ID NO:380).

OR229

## OR230

LOCUS AF073966 643 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR15-71M21 olfactory receptor gene,  
partial cds.  
ACCESSION AF073966  
KEYWORDS  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 643)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 643)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..643  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR15-71M21"  
mRNA <1..>643  
/product="olfactory receptor"  
CDS <1..>643  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="LVDIFFSSVTIPKMLANHLLGSKAISFGGCMAQMYFMISLGNTD  
SYILAAMAYDRAVAISRPLHYATIMSPQLCVLLVAGSWVIANANALPHTLLTARLSFC  
GNKDVANFYCDITPLLQLSCSDIRFNVKMMYLGVGVFVPLLCIISYVRVFSTVLRV  
PSTKGFLKALSTCGSHLTVVSLYYGTVMGMYFRPLTSYSLKHALITVMYTAVTP" (SEQ ID  
NO:385).  
40 BASE COUNT 133 a 171 c 148 g 191 t  
ORIGIN  
1 ccttgttac atctttctt cctctgttaac tattccaaag atgctggcca accatctcct  
61 aggttagcaag gccatctcct ttggggatg tatggcacag atgtactca tgatatcatt  
45 121 gggaaacaca gacagttaata tactagctgc aatggcatat gaccgagctg tggctatcag  
181 tcgccccgtt cattatgcaa caattatgag tccacaactt tggccctgc tgggtgcgtgg  
241 gtcctgggtt attgcaaatg ctaatgcact gccccacacc ctactcacag cttagattgc  
301 ctctgtggc aataaggatg tggccaactt ctactgtgac attacaccc ttgtccagct  
361 gtcctgttct gacatccgc tcaatgtgaa gatgtatgc ctgggggtgg gggcttcctc  
421 tgtgcactt ctgtgcata tcatctccta tggccggcgtt tttccacag tggccgggt  
481 tccatctacc aagggttcc tgaaggccctt gtccacccgtt ggctctcacc tgacagtgg  
541 gtcctgtat tatggacag tcatggccat gtatccgg cccctgacca gtacagtg  
601 gaagcatgca ttgataactg tgatgtacac ggcagtgacc cca (SEQ ID NO:384).

## OR231

LOCUS AF073967 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR15-71M24 olfactory receptor gene,  
partial cds.  
ACCESSION AF073967  
KEYWORDS  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR15-71M24"  
30 mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="LVDICFTTIVPQMLVNLLTQRKTILFAQCLTQMYFFVAFGITD  
SFLLAAMAIDRYVAICNPLHYNTVMSPRRCRLLVVASWAVSHLHSLTILMGRLSFC  
GPNVIHHFFCDVQPLLTSCSDTSINELLAFTEGSVVIMSPFILLISIFRTVLR  
VPSGEGRYKVFSTCGSHLTVALFYGTIISVYIRPSSTYSVTKDRVVTVIYTVVTP" (SEQ ID  
40 NO:387).  
BASE COUNT 134 a 180 c 128 g 207 t  
ORIGIN  
1 cctgggtggac atctgcitaa ccactgtcat cgccacag atgttagtga acttgtctac  
61 acagagaaaag acaatccctt tggccctgtg ctcactaa atgtattttct ttgtggcttt  
45 121 tggattaca gagatttcc tttggctgc gatggcatt gaccgtatg ttgtatttg  
181 caatccgtt cattacaaca cagtcatgag tcccaggcgc tgcgtgtgc ttgttgcc  
241 atccctggca gtgtccccatc ttcaactccctt caccacaca attctcatgg gtgccttc  
301 ttctctgttgc cccaatgtca ttcatcaactt cttttgtatg gtccagccac tgctgacact  
361 tcctctgtctt gacacccatca tcaatgagctt ctggcccttc acagagggtt ctgttgtaat  
421 catgagccctt ttatcttat tgggtctctt tataatctata ttcaactcggtt ctgttctgag  
481 ggtccctca ggggaaggaa ggtacaaatgtt tttcttacc tgggttctc acctcacatg  
541 tggtagactt ttctatggaa ccataatatc agtgcattt cggccctcat ccacactc  
601 agtgcacaaag gaccgagggtt tcactgtcat ctatagtaa gtacccca (SEQ ID NO:386).

## OR232

LOCUS AF073968 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR18M olfactory receptor gene,  
partial cds.  
ACCESSION AF073968  
KEYWORDS  
10 SOURCE western European house mouse.  
ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR18M"  
mRNA <1..>649  
/product="olfactory receptor"  
30 CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
/product="olfactory receptor"  
/translation="FSDLCFSSVTMPKLLQNMQIQDTPISYVACLTQMYFFSVFGSLE  
IFLLVVLAYDRYVAICLPLQYSSIMSPNLCVCVVFCWVFIVFYAMFHTLLLARLSFC  
KNNVIPHFFCDISALLKLACSDVYINELMILILGGFLVISLLIIVSYVQIVSSIILR  
ISSTRAIHKLFSCTCGSHLSVVSFLYGTIIGLYLCPSANNSTEKETAMSLMYTVVTP" (SEQ ID  
35 NO:389).  
NO:389).  
40 BASE COUNT 136 a 155 c 121 g 237 t  
ORIGIN  
1 ctctctgat ctctgccttt ccctgtcac aatgccaaag ttgcgtcaga acatgcagat  
61 ccaggacaca cccatatcc atgtggcttg tctgacacaa atgtacttt tcagtgtttt  
45 121 tggaaagtctg gagatattcc ttctgttagt cctggccat gaccgctatg tgcccatctg  
181 ttacccctt caatattcca gcatcatgag ccccaatctc tgtgtgtgt tggtgggtt  
241 ctgctggta ttatttgtt ttatgcccatt gttcacaca ctactctgg ctagattgtc  
301 attttgtaag aacaatgtga tccccactt ttctgtgac atatctgecc ttctgaagt  
361 ggcatgtct gatgtttata ttaatgaatt aatgatactt atcttggag ggttcttct  
50 421 tgtcatctca ctcttactca tcattgtatc ctatgtacaa attgtcttcctt caattttaaag  
481 gatttctct actcggtcta tccataagct ctctccacc tgggtcac acctgtctgt  
541 ggtctcaactg ttctatggaa caattatgg tctgtactta tgccatcag ctaataactc  
601 tactgaaaag gagactgcca tgccctgtat gtacacagtgtgactcccc (SEQ ID NO:388).

## OR233

LOCUS AF073969 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR1M olfactory receptor gene, partial  
cds.  
ACCESSION AF073969  
KEYWORDS  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR1M"  
30 mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FSDLCFSVTMPKLLQNIQSQDPSIPYAGCLAQTYFFMVFGDME  
SFLLVAMAYDRYVAICFPLHYTSIMSPKLCGCLMLLWMLTSHAMMHTLLAARLSFC  
ENNVILNFFCDLFVLLKLACSDTYVNELMIFIMSSLIVPFLIVMSYARIIASILK  
VPSIQGIYKFSTCGSHLSVVTLYGTIIGLYLCPSGNNSTVKGTVMAMMYTVVTP" (SEQ ID  
40 NO:391).  
BASE COUNT 142 a 161 c 123 g 223 t  
ORIGIN  
1 ctctctgtat ctctgccttt ccctgtcac aatgccaaa ttgctgcaga atatacagag  
61 ccaggaccacca tccatccccat atgcaggctg cctggcacaac acatacttct ttatggttt  
45 121 tggagatatg gagagcttc ttcttggtgc catggcctat gaccgctatg tgcccatctg  
181 ctcccctcg cattacacca gcatcatgag tccaaactc tggttgtgc taatgctgct  
241 attgtggatg ctaacaacat cccatgccc gatgcatact ctccctgcag caagattgtc  
301 ttttgtgag aacaatgtga tcctcaattt ttctgtgac ctatgttc tcctaaatgt  
361 ggcttgctca gacacattatg ttaatgagtt gatgatattt ataatgagtt ccctccat  
50 421 tggatattcca ttccatctca ttgtcatgtc ttatgcaagg atcattgcct ccattctaa  
481 ggttccatctt attcaaggaa tctacaagggt ctctccacc tggtgtccc atctgtctgt  
541 ggtgacccttg ttatggaa caattatgg tctctactta tgccatcag gtaataattc  
601 cacagtaaag gggactgtca tggccatgtat gtacacagtg gtgactccc (SEQ ID NO:390).

## OR234

LOCUS AF073970 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR21M olfactory receptor gene,  
partial cds.  
ACCESSION AF073970  
KEYWORDS  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR21M"  
30 mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FADICFTSASIPKMLVNIQTKNKVITYEGCISQVFFFILFGVLD  
NFLLA  
V  
MAYDRYVAICHPLHYMVIMNRRLCGFLVGSWVTALNSLLQSSMALRLSFC  
TDLKIPHFVCELNQLVLLACNDTPNDMVMYFAA  
I  
LGGGPLAGILYSYSKIVSSIRA  
ISSSQGKYKASSTCASHLSVVSLFYSTLLGA  
Y  
LSSSFTQNSHSTARASVMYSVVTP" (SEQ ID  
40 NO:393).  
BASE COUNT 150 a 156 c 122 g 221 t  
ORIGIN  
1 ctttgccagac atctgcatttta ctctctgcttag catccaaag atgcttagtga atatacagac  
61 aaagaacaag gtgataacct atgaagggtt catttctcaa gtattcttt tcatactatt  
45 121 tggaggttta gataactttc ttcttagctgt gtatggccat gaccgatatg tgccaatctg  
181 tcaccctctg cactatatgg tcatcatgaa ccggcccttc tgtggattt tagttttgg  
241 gtcctgggtc acaacagcat tgaattccctt gctgcagagt tcaatggcac tgccgctgtc  
301 cttttgtaca gacttgaaaa ttccccactt tgtttgtgag ctaatcaac tggtactact  
361 tgccctgtata gacacccccc ctaatgacat ggtgtatgtac ttgcagctt tactgtctgg  
50 421 tggtgttccctt cttgtggca cccttactt ttattctaag atagttccctt ccatacgatc  
481 aatctcatca tcacaggaaa agtataaaagg atccctccacc tggcatccc acctctcagg  
541 tgtttcatttta ttctattctt cactcttggg tgcgtatctt agttttttt ttacacaaaa  
601 ctcacactca actgcacgag catctgttat gtacagtgtg gtcacccccc (SEQ ID NO:392).

## OR235

LOCUS AF073971 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR22M olfactory receptor gene,  
partial cds.  
ACCESSION AF073971  
KEYWORDS  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR22M"  
30 mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FSDLCFSSVTMPKLLQNMQSQDSSITYAGCLTQMYFFLLFGDLE  
SFLLVAMAYDRYVAICFPLHYMSIMSPSLCVSLVLLSWLTTFHAMLHTLLMARLSFC  
EDNVIPYFFCDMSALLKLCSDTHVNELVIFVTGGLILVIPFVLILVSYARIVSSILK  
VPSARGIRKAFTCGSHLSVVSLFYGTIIGLYLCPSADNSTVKETVMAMMYTVVTP" (SEQ ID  
40 NO:395).  
BASE COUNT 121 a 184 c 140 g 204 t  
ORIGIN  
1 cttctctgat ctctgcgtt cctctgtcac aatgccaaa ttgcgtcaga acatgcagag  
61 ccaggactea tccatcacct atgcaggatg cctgaccaa atgtacttt tcttgcttt  
45 121 tggagacctt gagagctcc tccttgtggc catggctat gaccgctatg tggccatctg  
181 ctccccctt cattacatga gcatcatgag ccccgccctc tgtgtgagtc tggtgtctgt  
241 gtccctgggtg ctgaccactt tccatgccc gctgcatacc ctgtctatgg ccagattgt  
301 attctgtgag gacaatgtta tcccctactt ttctgtgac atgtctgtc tctgtgaagct  
361 gtcctgctt gacactcacg ttaatgaatt ggtgatattt gtcacaggag gcctgtatct  
50 421 tgcattcca ttgtgtca tccttgtgtc ctatgcacga attgtgtctt ccattctcaa  
481 ggtcccgat gctcgaggca tccgtaaaggc ctctccacc tgggtccc acctgtctgt  
541 ggtgtcaactg tctatggga caatcatgg tctgtactta tgccatcg ctgtataactc  
601 tactgtgaag gaaactgtca tggccatgtat gtacacagtgtgactccccc (SEQ ID NO:394).

## OR236

LOCUS AF073972 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR25M olfactory receptor gene,  
partial cds.  
ACCESSION AF073972  
KEYWORDS  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR25M"  
30 mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FTDLCFSTVTMPNFLQNMQSQVSSIPYAGCLAQMYFFLFFGDVE  
SLLLVAMAYDRYVAICFPLHYTRIMSPNLCVSMVLLSWALTTLYAMLHTLLLRLSFC  
KNNVIPHFFCDLSALLKLACSDIHNELMIMIIGALVVILPFLIIIVSYAHIVSSILK  
VPSTRGIHKVFSTCGSHLSVVSIFYGSVIVLYLCPSSNNSTVKDTVMSMMYTVVIP" (SEQ ID  
40 NO:397).  
BASE COUNT 136 a 163 c 118 g 232 t  
ORIGIN  
1 ctcactgac ctctgtttt ctactgtcac aatgccaaat ttccgtcaaa acatgcagag  
61 ccaagtatca tccattccct atgcaggctg ccttgeacaa atgtacttct ttttgtttt  
45 121 cggtgatgtt gagagttac ccctgttgc catggcttat gaccgttatg tgcccatctg  
181 cttcccttctt cattatacca gaatcatgag cccaaacctc tgttgagta tggtgctgt  
241 gtcctggca ctgacaacat tttatgccc tatgttgcact ttgttgcattaa cttagttgtc  
301 ttctgtaaa aacaatgtga tccccattt ttctgtgac ctttctgtc tcctgaagct  
361 ggcctgctc gatattcaca ttaatgagtt aatgataatg ataattggag cacttgttgc  
50 421 tatacttcca ttctactca tcatgttgc ttatgcgcac attgtctctt ccattctcaa  
481 agtccctca actcgaggca tccacaaggctt ctctccact tttgggtctc atctgtctgt  
541 ggtgtcaactt tttatgggt cagtcattgt tctgtactta tttccatcat ctatataactc  
601 tactgtgaag gatactgtca tgtctatgtat gtacactgtg gtgattccc (SEQ ID NO:396).

## OR237

LOCUS AF073973 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR27M olfactory receptor gene,  
partial cds.  
ACCESSION AF073973  
KEYWORDS  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR27M"  
30 mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FTDLCFSTVTMPNFLQNMQSQVSSIPYAGCLAQMYFFLFFGDVE  
SLLLVAMAYDRYVAICSPHLHYTRIMSPNLCVSMVLLSWALTTLYAMLHTLLLRLSFC  
KNNVIPHFFCDLSALLKLACSDIHNELMIMIIGALVVLPLLIIVSYAHIVSSTLK  
VPSTRGIHKVFSTCGSHLSVVSLFYGSVIVLYLCPSSNNSTVKDTVMSMMYTVVTP" (SEQ ID  
40 NO:399).  
BASE COUNT 136 a 165 c 117 g 231 t  
ORIGIN  
1 cttcaactgac ctctgtttt ctactgtcac aatgccccat ttccctgc当地 acatgcagag  
61 ccaagtatca tccattccct atgcaggctg ccttgc当地 aa atgtacttct ttttgtttt  
45 121 tggtgatgtt gagagttac tccttgc当地 catggccat gaccgttagt tgcccatctg  
181 ctccccctt cattatacaca gaatcatgag cccaaaccc ttttgtgatgtt tggtgtct  
241 gtcctggca ctgacaacat tttatgc当地 ctgc当地 acacttgc当地 ttcttgc当地  
301 ttctgtaaa aacaatgtga tccccat tttctgtgac ttcttgc当地 ttctgtgatgt  
361 ggcctgctt gatattcaca ttaatgaggta aatgataatg ataaatggag cacttgc当地  
40 421 tatacttcca ttctactca tcatagtgtc ttatgc当地 cacttgc当地 ttcttgc当地  
481 agtcccttca actcgaggca tccacaaggctt ctctccact ttttgtctc atctgtctgt  
541 ggtgtactt tttatgggt cagtc当地 tttgtactta ttgtccatcat ctaataactc  
601 tactgtgaag gatactgtca tgtctatgtat gtacactgtg gtgactccc (SEQ ID NO:398).

## OR238

LOCUS AF073974 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR28M olfactory receptor gene,  
partial cds.  
ACCESSION AF073974  
KEYWORDS  
10 SOURCE western European house mouse.  
ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR28M"  
mRNA <1..>649  
/product="olfactory receptor"  
30 CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
/product="olfactory receptor"  
/translation="VVDICYTSSGVPQMLAHFLMEKKTISFALCGTQLFFALTGGTE  
FLLLTAMAYDRYVAVCNPLRYTVVMNPRLCMGLAGVSWFVGVVNSAVETAVTMYLPTC  
GHNVLNHVACETLALVRACVDITLNQVVLASSVVLMIPCSLVSLSYAHIVAAIMK  
IRSTQGRRAFETCASHLTVVMSYGMALFTYLQPASTASAEQDKVVVIFYALVTP" (SEQ  
40 ID NO:401).  
BASE COUNT 119 a 183 c 166 g 181 t  
ORIGIN  
1 agtgggtggac atctgctaca cctccagtttggc atgcgtggcac acttcctcat  
61 ggagaaaaag accatctttt ttgcctatggcaccatggc ctcttgc ttctgactct  
45 121 tggggaaact gagtttctgt tgctgactgc catggcttatggcctatggc tggctgtctg  
181 taatccattatggcacatggatggaa ccaaggctc tgcatgggtc tagcagggtgt  
241 ctcttggtttt gtgggtgttag ttaattctgc tggtggacaca gcaatggcacatggc  
301 cacatgtggcacaatgttcaaccatgttggctgtggacacaatggcacatggc  
361 ggcctgtgtggacatccatggcataatgttggatgtggatgtggatgtggatgt  
421 gatgatgttttgcgtctgttgcgtatggcctatggcctatggcctatggc  
481 gatcggttccatggcaccatggcataatgttggatgtggatgtggatgt  
541 ggtctccatgttgcgtatggcataatgttggatgtggatgtggatgt  
601 tgctgagcag gacaagggtgg tagtgcgttttgcgtatggc (SEQ ID NO:400).

## OR239

LOCUS AF073975 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR29M olfactory receptor gene,  
partial cds.  
ACCESSION AF073975  
KEYWORDS  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR29M"  
30 mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FVDLCQSSVIMPKMLEKFVMVKSVISFAECMAQFYLFDVFAVSE  
CHMLAVMAYDRYVAICNPLLYNVTMSYKVCSWMVVGVYSGLICATGETVCLLRLFC  
KADDINHYFCDLLPLLEQSCSNTFINEILGLSFSSFNTTPALTILSSYIFIASILR  
IPSTEGRSKAFSTCSSHILAVA VFFGSLAFMYLQPSSVSSMDQGVSSVFYTIVVP" (SEQ ID  
40 NO:403).  
BASE COUNT 143 a 159 c 130 g 217 t  
ORIGIN  
1 ttccgtgac ctctgccagt ccagtgcat catgccaaa atgcggaga aatttgtcat  
61 ggtaagagt gtcattttt ttgcagaatg catggcttag tttacttat ttgtatgttt  
45 121 tgctgtttca gagtgtcaca tgctggctgt catggcttat gatcgctatg ttgcacatcg  
181 taacccttg ctatataatg ttaccatgtc ttacaaatgt tggcttgga tggtagtggg  
241 ggttatagt gtggcttga ttgtgccac agggaaaca gtctgcctgc tttagactgt  
301 attctgcaaa gctgatgaca taaaccacta ctctgtat ctttaccac tactggaaaca  
361 atccgttcc aatacattt acaatgaaat actaggactg tcctcgtt catttaatac  
50 421 tactgtccca gctctgacca tcctcgttcc ctacatcttc atcatagcca gcattcccg  
481 cattccctcc actgaaggca ggtccaaagc cttcagcacc tgcagctccc acatcttggc  
541 tggctgttc ttcttgggtt ctttagcatt catgtaccc tggccatcat cagtcagtc  
601 catggaccaa gggaaatgtt cctctgtttt tataaccattt gttgtgccc (SEQ ID NO:402).

## OR240

LOCUS AF073976 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR2M olfactory receptor gene, partial  
cds.  
ACCESSION AF073976  
KEYWORDS  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR2M"  
mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
30 /product="olfactory receptor"  
/translation="FTDLCFSVTMPKLLQNMQSQVPSIPYAGCLTQMYFFLFFGDLE  
SFLLVAMAYDRYVAICFPLHYTSIMSPRLCVSLVLSWLLTMHSMLHTLLLRLSFC  
ENVIPHFFCDLSALLKLACSDIHINELVIIIGGLVVILPFLVTVSYARISSILK  
VPSTRGIHKVFSTCGSHLSVVSFLFYGTIIGLYLCPSANSTLKDTVMSLMYTVVTP" (SEQ ID  
40 NO:405).  
BASE COUNT 126 a 177 c 123 g 223 t  
ORIGIN  
1 cttcaactgac ctctgtttt cctctgtcac aatgccccaaatggcagaatgcagatggc  
61 ccaaggttcc tcaatccccat atgcaggctg cctgacacaaatgtacttctttttttttt  
45 121 tggagatctt gagagcttcc tccttgtggc catggccttat gaccgatatgttagccatctg  
181 cttccctttt cattacacca gcattatggatcccaggctctgttgatggatctttgtgtgt  
241 gtcctgggtt ctgaccatgtt cccatccatgtgcacactttgtcttaatcttgc  
301 ttctctgttga aacaatgttgc tccccatattttctgtatctgtgtgc tgcgttgc  
361 ggcctgtctt gatattcaca ttaatgttgc ggtatattgtatggataggatggcttgc  
40 421 tataacttcca ttcttactcg ttcacagtgttccatgcacgc atcatcttccatcttca  
481 ggtcccttca actcgaggca tccacaaggcttcttccacttgcgttgc acctgtgt  
541 ggtgtcactt ttcataatggca caattatggatccatcttgc tgcgttgc  
601 tactctaaatggacactgttca tgcactgttgc tgcactgttgc (SEQ ID NO:404).

## OR241

LOCUS AF073977 650 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR3M olfactory receptor gene, partial  
cds.  
ACCESSION AF073977  
KEYWORDS .  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 650)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 650)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..650  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR3M"  
30 mRNA <1..>650  
/product="olfactory receptor"  
CDS <1..>650  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=3  
35 /product="olfactory receptor"  
/translation="FSDLCFSSVTMPKLLQNMQIQDTPISYVACLTQMYFFSVFGSLE  
IFLLVVLAYDRYVAICLPLQYSSIMSPNLCVCVVFCWVFIVFYAMFHTLLLARLSFC  
KNNVIPHFFCDISALLKLACSDVYINELMILILGGFLVTSLLIIVSYVQIVSSILR  
ISSTRAIHKLFSTCGSHLSVVSFLYGAIIIGLYLCPSANNSTEKETAMSLMYTVVTP" (SEQ ID  
40 NO:407).  
BASE COUNT 135 a 157 c 122 g 236 t  
ORIGIN  
1 cttctctga tctctgtca caatgccaa gtgtgcag aacatgcaga  
61 tccaggac acccatattc tatgtggctt gtctgacaca aatgtactt ttcatgttt  
45 121 ttggaaatct ggagatattc ctcttgttag tcctggccta tgaccgctat gtggccatct  
181 gtttaccct tcaatattcc agcatcatga gccccaaatct ctgtgttgtt gtgggttgt  
241 tctgctgggtt atttattgtt ttttatgccca ttttcacac actactcttg gcttagattgt  
301 cattttgtaa gaacaatgtt atcccacact ttttctgtta catalatctgcc ctctgttgt  
361 tggcatgttc tgatgtttat attaatgtat taatgtactt tatctggaa gggttcttc  
50 421 ttgtcacctc actcttacttc atcattgtat cttatgtaca aatgtctcc tcaattttaa  
481 ggatttcctc tactcggtt atccataaggc tcttcctccac ctgtggctca cacctgtctg  
541 tggtgtactt gttctatggg gcaattatttg gtctgtactt atgtccatca gctataact  
601 ctactgaaaa ggagactgcc atgtccctga tgtacacagt ggtgactccc (SEQ ID NO:406).

## OR242

LOCUS AF073978 648 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR4M olfactory receptor gene, partial  
cds.  
ACCESSION AF073978  
KEYWORDS  
10 SOURCE western European house mouse.  
ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 648)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 648)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..648  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR4M"  
mRNA <1..>648  
/product="olfactory receptor"  
30 CDS <1..>648  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
/product="olfactory receptor"  
/translation="FSDLCFSSVTMPKLLQNMQIQDTPISYVACLTQMYFFSVFGSLE  
IFLLVVLAYDRYVAICLPLQYSSIMSPNLCVCVVFCWVFIVFYAMFHTLLARLSFC  
KNVIPHFFCDISALLKLACSDVYINELMILILGGFLVISLLIIVSYVQIVSSIIR  
ISSTRAIHKLFSTCGSHLSVVSFLYGTIIGLYLCPSANNSTEKETAMSLMYTVVTP" (SEQ ID  
35 NO:409).  
BASE COUNT 135 a 154 c 122 g 237 t  
ORIGIN  
1 ctctctgat ctctgtttt cctctgtcac aatgcccaag ttgtcgaga acatgcagat  
61 ccaggacaca cccatatccct atgtggcttg tctgacacaa atgtactttt tcagtgttt  
45 121 tggaggatctg gagatattcc ttcttgtat cctggcttat gaccgctatg tgccatctg  
181 ttatcccctt caaatattcca gcatcatgag ccccaatctc tgggtgttg tgggtgtt  
241 ctgctggta ttatgtgtt ttatgccccat gttcacaca ctactctgg ctagattgtc  
301 attttgaag aacaatgtga tcccacactt ttctgtgac atatcgccc ttctgaagtt  
361 ggcatgcct gatgtttata ttaatgaattt aatgatactt atcttggag ggtttcct  
50 421 tgtcatctca ctcttacica tcattgtatc ctatgtacaa attgtccct caattttaag  
481 gattctct actcgggcta tccataagct ctctccacc tgggtcac accctgtct  
541 ggtctcaactg ttctatggga caattatgg tctgtactta tggccatcag ctaataactc  
601 tactgaaaag gagactgcca tggccctgat gtacacagtg gtgactcc (SEQ ID NO:408).

## OR243

LOCUS AF073979 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR5M olfactory receptor gene, partial  
cds.  
ACCESSION AF073979  
KEYWORDS  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR5M"  
30 mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FSDLCFSSVTMPKLLQNMQSQDPSIPIASCLTQMYFFMAFGNME  
IYLLVVV рAYDRYVAICFPLHYTSIMSPKLCVSLVVLSWVFTILYSMLHTLLLARLSFC  
EDNVIPHFFCDISALLKLACSDISINELMIFIVGGLDTVIPFLLIVSYVQIVCSILK  
FSSTRGIHKVFSTCGSHLSVVSFLFYGTIIGVYICPSANNSTVKETVMSLMYTVVTP" (SEQ ID  
40 NO:411).  
BASE COUNT 135 a 171 c 124 g 219 t  
ORIGIN  
1 ctctctgtat ctctgctttt cctctgtcac aatgcccaag ttgctgcaga acatgcagag  
61 ccaggaccca tccatccccat atgcccagctg tctgacacaa atgtactttt tcatggcctt  
45 121 tgggaacatg gaaatttac ttccttgtgt catggcttat gaccgctatg tggccatctg  
181 ctcccttctt cattacacca gcatcatgag ccctaagtc ttttgtctc tgggtttct  
241 ctcttggta ttaccattc ttttgtccat ttacacacc ctactctgg caagattgtc  
301 attctgttag gacaatgtga tcccccaattt tttctgtacat atatctgccct tgctcaagt  
361 ggcctgctct gacatttcta ttaatgaact aatgatattt atcgtggag ggcttgatac  
50 421 ttttgttactca ttatgttttccatgtacaa attgtctgtccatctaaa  
481 gttctcatctt acacggggca tacacaagg tttctccacc ttttgttccatcc acctgtctgt  
541 ggtctcaactg ttctatggca caattatgg ttttgttccatcc ttttgttccatcc  
601 tactgtgaag gagactgtca ttatgttttccatgtacaa attgtctgtccatctaaa (SEQ ID NO:410).

## OR244

LOCUS AF073980 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR6M olfactory receptor gene, partial  
cds.  
ACCESSION AF073980  
KEYWORDS  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR6M"  
30 mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FTDLCFSSVTMPKLLQNMQSQVPSIPIAGCLTQMYFFLFFGDLE  
SFLLVAMAYDRYVAICFPLHYTSIMSPRLCVSLVLLSWLLTMSHMLHTLLLRLSFC  
ENNVIPHFFCDLSALLKLACSDIHINELVILIIGGLVVILPFLLVTPYARISSILK  
VPSTRGIHKVFSTCGSHLSVVSFLFYGTIIGLYLCPSANNSTLKDTVMSLMYTVVTP" (SEQ ID  
40 NO:413).  
BASE COUNT 126 a 178 c 123 g 222 t  
ORIGIN  
1 cttcaactgac ctctgtttt cctctgtcac aatgcccaag ttgtgcaga acatgcagag  
61 ccaaggcttct tcaatccccat atgcaggctg cctgacacaa atgtactctt ttttgtttt  
45 121 tggagatctt gagagcttc cccttggtgc catggcctat gaccgatatg tagccatctg  
181 cttcccttctt cattacacca gcattatgag ccccaggctc tgtgtgatgc ttgtgtctg  
241 gtcctggttt ctgaccatgt cccattccat gctgcacact ttgcttttaa ctagggtttc  
301 ttctctgtaa aacaatgtga tccccatctt ttctctgtat ctgtctgtctc tgctgaagct  
361 ggcctgctct gatattcaca ttaatgaatt ggtgtatgtt atcataggag ggcttgggt  
50 421 tatacttcca ttctctactcg tcacagtgcc ttatgcacgc atcatctctt ccattctcaa  
481 ggtcccttca actcgaggca tccacaaggctt ctctccact tttgtgttcc acctgtctgt  
541 ggtgtactg ttctatggga caattatgg cctctactta tgccatctg ctaataactc  
601 tactctaaag gacactgtca tgtctctgtat gtacactgtg gtaactcccc (SEQ ID NO:412).

## OR245

LOCUS AF073981 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR7M olfactory receptor gene, partial  
cds.  
ACCESSION AF073981  
KEYWORDS .  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR7M"  
30 mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FTDLCFSTVTMPNFLQNMQSQVSSIPYAGCLAQMYFFLFFGDVE  
SLLLVAMAYDRYVAICFPHYTRIMSPNLCSVMSWALTTLYAMLHTLLLRLSFC  
KNVIPHFCDLSALLKLACSDIHINELMIMIIGALVVILPFLLIVSYAHIVSSILK  
VPSTRGIHKVFSTCGSHSAVSLFYGSVIVLYLCPSSNNSTVKDTVMSMMYTVVTP" (SEQ ID  
40 NO:415).  
BASE COUNT 136 a 165 c 117 g 231 t  
ORIGIN  
1 cttcaactgac ctctgttcc ttactgtcac aatggccaaat ttcttgcaaa acatgcagag  
61 ccaagtatca tccattccct atgcaggctg ccttgaccaa atgtacttct ttttgtttt  
45 121 tggtgatgtt gagagcttac cccttggatgc catggcctat gaccgtatg tgcccatctg  
181 cttcccttctt cattatacca gaatcatgag cccaaaccc tgggtggatca tgggtgtct  
241 gtcctggca ctgacaatcat tggatgtccat gttgcacact tttctttaa ctaggtgtc  
301 ttctgtaaa aacaatgtga tccccatcc ttctgtgac ctttctgtctc tcctgaagct  
361 ggcctgtctc gatattcaca ttaatggat aatgataatg ataattggag cacttggat  
421 tatacttcca ttcttactca tcataatgtc ttatgcgcac attgtccct ccattctcaa  
481 agtcccttca actcgaggca tccacaaggcttcttccact tgggttctc atctgtctgc  
541 ggtgtcaactt tcttatgggt cagtcattgt tctgtactta tgccatcat ctaataactc  
601 tactgtggaa gataacttca ttctttagat gtacactgtg tgactccc (SEQ ID NO:414)

## OR246

LOCUS AF073982 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR8M olfactory receptor gene, partial  
cds.  
ACCESSION AF073982  
KEYWORDS  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR8M"  
30 mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FSDLCFSSVTMPKLLQNIQSQDPSIPYAGCLAQTYFFMVFGDME  
SFLLVAMAYDRYVAICFPLHYTSIMSPKLCGCLMLLWMLTSHAMMHTLAAARLSFC  
ENNVILNFFCDLFVLLKLACSDTYVNELMIFIMSSLIVIPFFLIVMSYARIIASILK  
VPSIQGIYKVFSTCGSHLSVVTFYGTIIGLYLCPSGNNSTVKGTVMAMMYTAVTP" (SEQ ID  
40 NO:417).  
BASE COUNT 143 a 162 c 123 g 221 t  
ORIGIN  
1 ctctctgtat ctctgtttt cctctgtcac aatgcacaaa ttgctgcaga atatacagag  
61 ccaggaccca tccatcccc atgcaggctg cctggcacaa acatacttct ttatggttt  
45 121 tggagatat gagagttcc ttccttgcc catggcctat gaccgcata gggccatcg  
181 cttccctcg cattacacca gcatcatgag tcccaaactc tggttgttc taatgctgt  
241 attgtggat ctaacaacat cccatgccc gatgcatact tccttgccag caagattgtc  
301 ttttgtgag aacaatgtga tcctcaattt ttctgtgac ctatggatcc tccaaagct  
361 ggcttgctca gacactatg ttaatggat gatgatatt ataatggat cccctccat  
421 tggttattcca ttttcctca ttgtcatgtc ttatgcaagg atcatggct ccattctaa  
481 ggttccatctt attcaaggga tctacaagg tttctccacc tggtgtccc atctgtctgt  
541 ggtgacccttg ttttatggga caattatgg tctctactta tgccatgag gtaataattc  
601 cacagtaaag gggactgtca tggccatgtat gtacacagcg gtgactccc (SEQ ID NO:416).

OR247

LOCUS AF073983 649 bp DNA ROD 12-JUL-1999  
 5 DEFINITION Mus musculus domesticus clone OR912-47M4 olfactory receptor gene,  
     partial cds.  
 ACCESSION AF073983  
 KEYWORDS  
 SOURCE western European house mouse.  
 10 ORGANISM Mus musculus domesticus  
     Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
     Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
 REFERENCE 1 (bases 1 to 649)  
 15 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
     potentially functional  
 JOURNAL Unpublished  
 REFERENCE 2 (bases 1 to 649)  
 20 AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
 TITLE Direct Submission  
 JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
     UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
     France  
 FEATURES Location/Qualifiers  
 25 source 1..649  
     /organism="Mus musculus domesticus"  
     /sub\_species="domesticus"  
     /db\_xref="taxon:10092"  
     /clone="OR912-47M4"  
 mRNA <1..>649  
     /product="olfactory receptor"  
 30 CDS <1..>649  
     /note="region between transmembrane domains TM2 and TM7."  
     /codon\_start=2  
     /product="olfactory receptor"  
     /translation="FVDICFTSTTVPKMLVNIQTQSKAITYADCISQMSVFLVFAELD  
         NFLLAVMAYDRYVAICHPLYYTIVVNQHLCILMVLLSWVVSILHAFLQSSIVLQLTFC  
         GDVKIPHHFCELNQLSQLTCSDSFSSQLIMNLVPVLLAVISFSSILYSYFKIVSSICS  
         ISSVQGKYKAFSTCVSHLSIVSLFYSTGLGVYVSSVIQSSHSAARASVMYTVVTP" (SEQ ID  
 35 NO:419).  
 BASE COUNT 148 a 157 c 118 g 226 t  
 ORIGIN  
     1 ctttgtggac atctgttta cctccaccac tgtcccaaag atgctggtaa atatacagac  
     61 tc当地agcaag gccattacat atgcagactg tattagccag atgtctgtct tcttggttt  
 45 121 tgcagaattg gacaacttgc tcctggctgt gatggcctat gaccgatatg tggctatctg  
     181 tc当地ccatta tattacacag tcattgttaa ccaacatctc tgtatactga tggttctgt  
     241 gtcctgggtt gtttagcatcc tacatgcctt cttacagagc tcaattgtgc tacagtgtac  
     301 ctttgtggaa gatgaaaaaa ttccccactt ctctctgtgg cttaaaccaggc tgctcaact  
     361 cacatgttca gacagctttt caagccaaact cataatgaat ctgttacatg ttctattggc  
     421 agtcatattcc ttccatgttgc tcctttactc ttatgttcaag atatgttgcctt cc当地tatgttc  
     481 tatctctca gtc当地aggaa agtacaaggc atttttctaca tgatgttgc acctttccat  
     541 tgtctctta ttatgttgc caggccttgg agtgtatgtc agtctgttg tgatccaaag  
     601 ctctcaactt gtc当地aggaa cctctgttgc gtatctgtg gtc当地ccccc (SEQ ID NO:418).

## OR248

LOCUS AF073984 646 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR912-47M6 olfactory receptor gene,  
partial cds.  
ACCESSION AF073984  
KEYWORDS  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 646)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 646)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..646  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR912-47M6"  
mRNA <1..>646  
/product="olfactory receptor"  
CDS <1..>646  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
30 /product="olfactory receptor"  
/translation="SVDVCFSSTTVPKVLAIIHLRNQAISFSGCLTQLYFLCVFADMD  
NFLLAVMAYDRFVAICHPLHYTTKMTHQQLCAFLVGSMVASLNALLHTLLVAQLYFC  
GDNVIPHFFCEVTPLLKLSCSDTHLNEMLAVAGLIMLAPFVCILLSYILIACAILK  
ISSTGRWKAFSTCGSHLAVVCLFYGTIISLYNPSSHSAGRDMAAAMMYTVVTP" (SEQ ID  
35 NO:421).  
BASE COUNT 128 a 178 c 133 g 207 t  
ORIGIN  
1 ctctgtggat gtatgttct cttccaccac tgccttaag gtactggcca ttcacatact  
61 aagaatcaa gccattcg tctctgggtg cttcacacag ctgtatttc tctgtgttt  
45 121 tgctgacatg gacaatttc tgctggctgt gatggctat gaccgatttg tggccatatg  
181 ccaccttta cactacacaa caaagatgc ccatcagctt tggccattc ttgttgtgg  
241 gtcctggatg gtatcgatc tgaatgtct gttgcacaca ctgctcgatc ctcaactcta  
301 ctctgtgg gacaatgtca tccccactt ctctgtgaa gtactcccc tgctgaaact  
361 ctctgtca gacacacatc tcaatgaggat gatgattctt tggctgtgg ggctgataat  
50 421 gtagctcca ttgttgtca tcctctgtc ttatatcctt atgctgtgtt ccatccgtaa  
481 aatctcatcc acaggaagat ggaaagcctt ctctacatgtt ggctcacact tggctgtgt  
541 gtgccttc tatggacta tcataatccct gtatcaac ccctcatctt ctcaactcagc  
601 tgggaggagc atggcagctg ccatgatgtc cacagtggt accccc (SEQ ID NO:420).

OR249

## OR250

LOCUS AF073986 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR912-47M8 olfactory receptor gene,  
partial cds.  
ACCESSION AF073986  
KEYWORDS  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
/clone="OR912-47M8"  
30 mRNA <1..>649  
/product="olfactory receptor"  
CDS <1..>649  
/note="region between transmembrane domains TM2 and TM7."  
/codon\_start=2  
35 /product="olfactory receptor"  
/translation="FVDICFTSTVPKVLVNIQTQSKAITYADCISQMSVFLVFAELD  
NFLLAVMA YDRYVAICHPLYYTIVNQHLCILMVLLSWVSILHAFLQSSIVLQLTFC  
GDVKIPHFFCELNQLSQLTCLDSFSSHLMNLVPVLLAVISFSSILYSYFKIVSSICS  
ISSVQGKYKAFSTCVSHLSIVFLFYSTGLGVYVSSAVVQSSHSAARASVMYTVVTP" (SEQ ID  
40 NO:425).  
BASE COUNT 144 a 159 c 120 g 226 t  
ORIGIN  
1 ctttggac atctgttca cctccaccac tgtccaaag ggctggtaa atatacagac  
61 tcaaaggaa gccattacat atgcagactg tattagccag atgtctgtct tcttggttt  
45 121 tgcagaattt gacaacttc tcctggctgt gatggcctat gaccgatatg tggctatctg  
181 tcacccattt tattacacat tcattgttaa ccaacatctc tggataactgt tggttctgt  
241 gtcctgggtt gtagcatcc tacatgcctt cttacagagc tcaattgtgc tacagttgac  
301 ctttgtgga gatgtaaaaa ttccccactt ttctcgagc cttaccaggc tggctcaact  
361 cacatgtta gacagcttt caagccacct cataatgaat ctgttacctg ttctattggc  
50 421 agtcatttcc ttcaatgttca ttcatttttttcaag atatgttctt ccattatgttc  
481 tatcttcata gttcaaggaa agtacaaggc attttctaca tggctcttc acctttccat  
541 tggcttctta ttatgtta caggccttgg agtgtatgtc agttctgttg tggctcaag  
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## OR251

LOCUS AF073987 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR912-47M9 olfactory receptor gene,  
partial cds.  
ACCESSION AF073987  
KEYWORDS  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
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30 mRNA <1..>649  
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CDS <1..>649  
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35 /product="olfactory receptor"  
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GNVINHFFCEPPALLKLASADTYSTEMAIFAMGVVILLAPVSLILTSYWNIIISTVIQ  
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40 NO:427).  
BASE COUNT 141 a 175 c 146 g 187 t  
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45 121 cggatgcaca gagttgtgcac tgctggcaat gatgtcctat gaccgatatg tggctgtctg  
181 caaacctctg cactactcca ccatcatgac acactggcta tgtgtcagc tggctgcagg  
241 gtcctgggcc agtgggtgcac ttgtgtccct ggtggatacc acattcacat tacgtctcc  
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361 ggcatcgcca gatacataca geacagagat ggcgatctt gcaatgggtg tggtaatcc  
50 421 ccttagcacct gtctccctca tcctcaccc tcatactggaa atcatctcca ctgtaatcca  
481 gatgcagtctt ggggaaggaa ggctcaagggt ctctccaccat tgffgctccc acctcattgt  
541 ttttttttttcttcttccat cagcaatatt tgcttacatg agggccaaact ctaagataat  
601 gaatgaaaag gataaaatgtt tttcggtttt ctattcagca gtgaccccg (SEQ ID NO:426).

## OR252

LOCUS AF073988 649 bp DNA ROD 12-JUL-1999  
5 DEFINITION Mus musculus domesticus clone OR9M olfactory receptor gene, partial  
cds.  
ACCESSION AF073988  
KEYWORDS .  
SOURCE western European house mouse.  
10 ORGANISM Mus musculus domesticus  
Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Mammalia;  
Eutheria; Rodentia; Sciurognathi; Muridae; Murinae; Mus.  
REFERENCE 1 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
15 TITLE Mouse olfactory receptor genes orthologous to human pseudogenes are  
potentially functional  
JOURNAL Unpublished  
REFERENCE 2 (bases 1 to 649)  
AUTHORS Giorgi,D.G., Delettre,C. and Rouquier,S.R.P.  
20 TITLE Direct Submission  
JOURNAL Submitted (23-JUN-1998) Institut de Genetique Humaine (IGH), CNRS  
UPR 1142, 141 rue de la Cardonille, Montpellier 34396 Cedex 5,  
France  
FEATURES Location/Qualifiers  
25 source 1..649  
/organism="Mus musculus domesticus"  
/sub\_species="domesticus"  
/db\_xref="taxon:10092"  
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CDS <1..>649  
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ENNVIPHFFCDLSALLKLACSDIHINELVILIIGGLVVILPFLLTYSARISSIILK  
VPSTRGIHKVFSTCGSHLSVVSFLFYGTIIGLYLCPSANNSTLKDTVMSLMYTVVTP" (SEQ ID  
40 NO:429).  
BASE COUNT 126 a 177 c 123 g 223 t  
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61 ccaaggccct tcaatccccat atgcaggcgtg cctgcacacaa atgtactctt ttttgtttt  
45 121 tggagatctt gagagcttcc tccttggtgc catggctat gaccgatatg tagccatctg  
181 ctteccctttt cattacacca gcattatgag ccccaggctc tggtgtggatc ttgtgtgtct  
241 gtccctgggtt ctgaccatgtt cccattccat gctgcacact ttgctcttaa ctgggtgttc  
301 ttctctgtgaa aacaatgtga tccccctttt ttctctgtat ctgtctgtc tgcgtgaagct  
361 ggcctgtctt gatattcaca ttaatgaattt ggtgtatgg atcataggag ggctgtgt  
50 421 tatacttcca ttctactcg tcaacatgttc ttatgcacgc atcatctctt ccattctcaa  
481 ggtcccttca actcgaggca tccacaaggat ttctccact tgggttctc acctgtctgt  
541 ggtgtactt tctatggga caattattgg cctctactta tgcgtatgt ctaataactc  
601 tactctaaag gacactgtca tgcgtatgt gtaactgtc gtaactccc (SEQ ID NO:428).

OR253

661 gtgttggga atcttcat cattctggcc gtcagcatgg actctcaccc gcatactccc  
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 781 cctaaggatgt tggtaatat ccaaaccacag agcaagtcca ttcctatgc agaatgcac  
 841 acccgattt atttttcat gcitcttggg ggcgtggaca cactctcc caccgtgt  
 901 gcctatgacc gattttggc catctgtcac ccacttactt attcgtcat tatgaatct  
 961 caactaagtgt gtttgcgt tttgtatca tggtttatta gcttttcata ttctctgata  
 1021 cagagctat tgatgtcg gttgtccctc tgtaaaaaatc agataatcaa acactttac  
 1081 tgtgaatatg ccaaagccct cactatagcc tgctcagata cactaatcaa tcataatcc  
 1141 ctttatattt tgatatggg ctttgccttc atcccccttct cagggatcct ttatcatac  
 1201 tataaaaattt ttcttcaat ttggagaattt ccatcaacag atggaaaata taaaggattt  
 1261 tctacctgt ggtctcatct atccgggtt tttttatctt atggggacagg ctttagtgt  
 1321 taccttagtt ctgtatgc ttcctccctt gggaggccg tggggccctc agtaatgtat  
 1381 acatgtgtca ccccccattttt gaaaccttcc atctacatgt tgagaaacaa agacatattaaag  
 1441 aaggccctaa aaacacttgg gagaataactt ctttaaagt gataatitca ctggtttttag  
 1501 acatctgaac tgatagaaat aaaatagtga actaaagaaa ttctgtacta taatcatgt  
 1561 gaaaattttt ccagggtt ggtctatctt tgataaaaat tataactgtga atatttctat  
 1621 ctgaaatttc tatgtatgcct ctttttat tcgaagtttctt tttttccctc ccctgtttta  
 1681 tacgacatattt ttctttactt cagtaaaaaat ttttttttttccctc ccctgtttta  
 1741 caaataccaa ttcatgaattt gtttagaaaa agttatgcaat tggctcattt acagaaatgc  
 1801 catgtatata tatataacac ttttttttttccctc ccctgtttta  
 1861 tgcag (SEQ ID NO:430).

As used herein, the terms "ORX nucleic acid sequence" and/or "ORX nucleic acid molecule" specifically refer to the sequences of GenBank Accession Nos. AF022649, AF073959-073989, AF127814-127907, and AF179716-179843.

Likewise, the term “ORX polypeptide” specifically refers to the polypeptide sequences of GenBank Accession Nos. AF127814, AF127816-127819, AF127821-127824, AF127836-127837, AF127840, AF127845-127848, AF127851-127852, AF127857, AF127859, AF127861-127862, AF127865, AF127867-127868, AF127870-127872, AF127874-127884, 30 AF127886, AF127888, AF127896-127904, AF127906-127907, AF179716-179717, AF179720-179728, AF179730-179737, AF179739-179746, AF179748-179750, AF179752, AF179755-179756, AF179758-179761, AF179766-179767, AF179770-179771, AF179773-179775, AF179777-179779, AF179784-179788, AF179790-179792, AF179794, AF179796-179799, AF179802-179811, AF179814, AF179816-179818, AF179820, AF179822-179832, 35 AF179834-179839, AF179841-179843, and AF073959-073989.

To sample the ORX genes in primate species, ORX genes were randomly sequenced from anthropoids and prosimians (See FIG. 1). As outlined in Examples 1-3, *infra*, ORX genes were obtained by PCR on genomic DNA from the different species using consensus ORX primer pairs OR5B-OR3B and OR3.1-OR7.1 chosen respectively in the transmembrane

individual ORX clones were sequenced per taxon. A total of 221 ORX sequences, representing ten species, was analyzed. These sequences are distributed in different groups whose percentage of nucleotide sequence identity (NSI) ranges from ~35 to >99%. The corresponding amino acid sequences were compared to a variety of ORX sequences from the public databases and previous studies. See Rouquier et al., (1998) *Nature Genet.* 18, 243-50.

All sequences have the characteristic features of olfactory receptors, with a heptahelical structure and conserved motifs as previously defined. See Buck et al., (1991) *Cell* 65, 175-187; Rouquier et al., (1998) *Nature Genet.* 18, 243-50; and Rouquier et al., (1998) *Hum. Mol. Genet.* 7, 1337-45. The use of two pairs of consensus primers made the sampling representative of the ORX gene repertoire. Primate sequences are distributed in seven families (sequences that share >40% amino-acid identity (ASI) define a family), and 56 subfamilies (sequences that share >60% ASI define a subfamily). Group 1-II of family 1 represents the zone of overlap of sequences derived from using the two primer pairs (See FIG. 2).

Non-human primate ORX genes are represented in 6 families and about 45 subfamilies. Numerous sequences are grouped in family 1 (~66%) comprising subfamily 1A, the largest subfamily (57/221, 26%). Subfamily 1B is almost devoid of coding human ORX sequences (FIG. 2). Subfamily 1A contains only human pseudogenes originating from chromosomes 14 and 19 whereas subfamily 1B contains human pseudogenes lying on various chromosomes. As has been previously found for human, the amino-acid sequences deduced from the non-human primate sequences revealed many pseudogenes (FIG. 2 and Table 1).

Table 1 provides information about the evolution of the pseudogene fraction along with the evolution of primates. Hominoids present the highest fraction of pseudogenes (39 to >70%, average ~50%). Old world monkeys (macaque and baboon) have a lower pseudogene fraction (20 to 35%, average 27%), while even fewer pseudogenes were found among the sequences derived from new world monkeys. Only one pseudogene (SBO64) was identified among the 49 sequences obtained from marmoset and two species of squirrel-monkey. In contrast, 37% of the prosimian lemur ORX sequences were pseudogenes.

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TABLE 1

Species		Number of sequences analyzed	% ORF	% pseudogenes	Average % pseudogenes
Hominoids	Human	Homo sapiens (HSA)	99	30	70
	Chimpanzee	Pan troglodytes (PTR)	21	52	48
	Gorilla	Gorilla gorilla (GGO)	18	50	50 %
	Orangutan	Pongo pygmaeus (PPY)	23	61	39
	Gibbon	Hylobates lar (HLA)	22	59	41
Old world monkeys	Macaque	Macaca sylvanus (MSY)	20	65	35
	Baboon	Papio papio (PPA)	21	81	19
					27 %
New world monkeys	Marmoset	Callithrix jacchus (CJA)	19	100	0
	Squirrel-monkey	Saimiri scireus (SSC)	15	100	0
		Saimiri boliviensis (SBO)	15	93	7

Prosimians	Lemur	Eulemur fulvus (EFU)	19	58	42	37 %
		Eulemur rubriventer (ERU)	16	69	31	
Rodents	Mouse	Mus musculus (MMU)	33	100	0	0 %
Fish	Zebrafish	Danio rerio (DRE)	3	100	0	0 %

Diverse reasons have been suggested that could account for the differences in olfactory ability among mammals, *i.e.*, the size of the anatomical structures devoted to olfaction (olfactory epithelium, olfactory bulb, cortical structures), or the number of ORX families/subfamilies, and the total number and diversity of expressed ORX genes. The olfactory epithelial surface of 5 macrosmatic animals, such as dogs, is larger than in microsmatic humans. On the other hand, using unique dog sequence probes that represent specific ORX subfamilies and which will not cross-hybridize with other subfamilies, comparative analyses have been performed by Southern blot analysis among a panel of mammals including dog and human. The number of ORX sequences per subfamily is similar in microsmatic and macrosmatic animals. A high fraction 10 (>70%) of the human ORX genes have been mutated during evolution into pseudogenes.

Chromosomes 7, 16 or 17 contained a high fraction of potentially coding ORX sequences, whereas other chromosomes such as chromosome 3 or 11 contained primarily pseudogenes. Other studies on chromosome 17 and on chromosome 11 in which 75% of the ORX sequences identified were pseudogenes, support these observations.

15 All ORX sequences derived from mouse are potentially coding. No pseudogenes were detected either by sequencing randomly selected ORX sequences or by deliberately screening with human ORX pseudogene probes. This indicates that the ORX pseudogene content is either zero or restricted to rare examples in mouse.

Thus, the reduction of the sense of smell could correlate with the fraction of functional 20 ORX genes in the genome.

It is difficult to measure and compare the olfactory efficiency of different animal species. Various parameters such as the threshold of detection of odorants (sensitivity), the range of odors detectable and the discriminatory power (acuity) are key parts of the olfactory ability. Thus it is uncertain to determine precisely which of these parameters are taken in account when comparing 25 two species, and therefore the origin of the olfactory deficiency of primates remains a controversial and difficult point to address.

The chromosomal distribution of the ORX gene repertoire arose through multiple duplication rounds giving rise to paralogous regions. Even though the number of duplication events may be different among the mammals, overall it appears that the number of ORX genes 30 was established before the divergence of mammals. See Ben-Arie et al., (1994) *Hum. Mol. Genet.* 3, 229-35. This explains why, by Southern analysis, there is no striking difference in the

number of ORX genes of four different subfamilies between the sea lion, which has an underdeveloped olfactory apparatus, and other mammals. *See id.* On the other hand, the Southern blot approach does not reveal the functionality of the ORX sequences, and we predict that a large fraction of the sea lion ORX genes could be pseudogenes as has been described for  
5 the dolphin. *See* Sharon et al., (1999) *Genomics*, 61, 24-36. Similarly striking differences have been observed in the olfactory ability of different breeds of dogs. *See* Issel-Tarver et al., (1996) *Proc. Natl. Acad. Sci. USA* 93, 10897-902. Despite the variations in the size of the olfactory epithelium of the different breeds, it would be interesting to know what the biological basis is for the differences in performances observed between sight and scent hounds. One obvious  
10 possibility is loss of functional ORX genes, but, given the recent origin of all modern dogs this explanation seems unlikely. Other explanations could be changes in behavior, or in expression brought about by the modification of a key master transcription factor or in the unusual mechanism that allows only one ORX gene allele or the other to be expressed exclusively in any one epithelium cell.

15

### **ORX Nucleic Acids**

The nucleic acids of the invention include those that encode an ORX polypeptide or protein. As used herein, the terms polypeptide and protein are interchangeable.

In some embodiments, an ORX nucleic acid encodes a mature ORX polypeptide. As used  
20 herein, a “mature” form of a polypeptide or protein described herein relates to the product of a naturally occurring polypeptide or precursor form or proprotein. The naturally occurring polypeptide, precursor or proprotein includes, by way of nonlimiting example, the full-length gene product, encoded by the corresponding gene. Alternatively, it may be defined as the polypeptide, precursor or proprotein encoded by an open reading frame described herein. The  
25 product “mature” form arises, again by way of nonlimiting example, as a result of one or more naturally occurring processing steps that may take place within the cell in which the gene product arises. Examples of such processing steps leading to a “mature” form of a polypeptide or protein include the cleavage of the N-terminal methionine residue encoded by the initiation codon of an open reading frame, or the proteolytic cleavage of a signal peptide or leader sequence. Thus a mature form arising from a precursor polypeptide or protein that has residues 1 to N, where  
30 residue 1 is the N-terminal methionine, would have residues 2 through N remaining after removal

of the N-terminal methionine. Alternatively, a mature form arising from a precursor polypeptide or protein having residues 1 to N, in which an N-terminal signal sequence from residue 1 to residue M is cleaved, would have the residues from residue M+1 to residue N remaining. Further as used herein, a “mature” form of a polypeptide or protein may arise from a step of post-translational modification other than a proteolytic cleavage event. Such additional processes include, by way of non-limiting example, glycosylation, myristylation or phosphorylation. In general, a mature polypeptide or protein may result from the operation of only one of these processes, or a combination of any of them.

5 Among the ORX nucleic acids is the nucleic acid whose sequence is provided by  
10 GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or a fragment thereof. Additionally, the invention includes mutant or variant nucleic acids of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or a fragment thereof, any of whose bases may be changed from the corresponding bases shown in the ORX nucleic acids, while still encoding a protein that  
15 maintains at least one of its ORX-like activities and physiological functions (*i.e.*, modulating angiogenesis, neuronal development). The invention further includes the complement of the nucleic acid sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, including fragments, derivatives, analogs and homologs thereof. The invention additionally includes nucleic acids or nucleic acid fragments,  
20 or complements thereto, whose structures include chemical modifications.

One aspect of the invention pertains to isolated nucleic acid molecules that encode ORX proteins or biologically active portions thereof. Also included are nucleic acid fragments sufficient for use as hybridization probes to identify ORX-encoding nucleic acids (*e.g.*, ORX mRNA) and fragments for use as polymerase chain reaction (PCR) primers for the amplification  
25 or mutation of ORX nucleic acid molecules. As used herein, the term “nucleic acid molecule” is intended to include DNA molecules (*e.g.*, cDNA or genomic DNA), RNA molecules (*e.g.*, mRNA), analogs of the DNA or RNA generated using nucleotide analogs, and derivatives, fragments and homologs thereof. The nucleic acid molecule can be single-stranded or double-stranded, but preferably is double-stranded DNA.

30 “Probes” refer to nucleic acid sequences of variable length, preferably between at least about 10 nucleotides (nt), 100 nt, or as many as about, *e.g.*, 6,000 nt, depending on use. Probes

are used in the detection of identical, similar, or complementary nucleic acid sequences. Longer length probes are usually obtained from a natural or recombinant source, are highly specific and much slower to hybridize than oligomers. Probes may be single- or double-stranded and designed to have specificity in PCR, membrane-based hybridization technologies, or ELISA-like  
5 technologies.

An "isolated" nucleic acid molecule is one that is separated from other nucleic acid molecules that are present in the natural source of the nucleic acid. Examples of isolated nucleic acid molecules include, but are not limited to, recombinant DNA molecules contained in a vector, recombinant DNA molecules maintained in a heterologous host cell, partially or  
10 substantially purified nucleic acid molecules, and synthetic DNA or RNA molecules. Preferably, an "isolated" nucleic acid is free of sequences which naturally flank the nucleic acid (*i.e.*, sequences located at the 5' and 3' ends of the nucleic acid) in the genomic DNA of the organism from which the nucleic acid is derived. For example, in various embodiments, the isolated ORX nucleic acid molecule can contain less than about 50 kb, 25 kb, 5 kb, 4 kb, 3 kb, 2 kb, 1 kb, 0.5  
15 kb or 0.1 kb of nucleotide sequences which naturally flank the nucleic acid molecule in genomic DNA of the cell from which the nucleic acid is derived. Moreover, an "isolated" nucleic acid molecule, such as a cDNA molecule, can be substantially free of other cellular material or culture medium when produced by recombinant techniques, or of chemical precursors or other chemicals when chemically synthesized.

20 A nucleic acid molecule of the present invention, *e.g.*, a nucleic acid molecule having the nucleotide sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or a complement of any of these nucleotide sequences, can be isolated using standard molecular biology techniques and the sequence information provided herein. Using all or a portion of the nucleic acid sequence of GenBank  
25 Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, as a hybridization probe, ORX nucleic acid sequences can be isolated using standard hybridization and cloning techniques (*e.g.*, as described in Sambrook *et al.*, eds., MOLECULAR CLONING: A LABORATORY MANUAL 2<sup>nd</sup> Ed., Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY, 1989; and Ausubel, *et al.*, eds., CURRENT PROTOCOLS IN MOLECULAR BIOLOGY,  
30 John Wiley & Sons, New York, NY, 1993.)

A nucleic acid of the invention can be amplified using cDNA, mRNA or alternatively, genomic DNA, as a template and appropriate oligonucleotide primers according to standard PCR amplification techniques. The nucleic acid so amplified can be cloned into an appropriate vector and characterized by DNA sequence analysis. Furthermore, oligonucleotides corresponding to  
5 ORX nucleotide sequences can be prepared by standard synthetic techniques, e.g., using an automated DNA synthesizer.

As used herein, the term “oligonucleotide” refers to a series of linked nucleotide residues, which oligonucleotide has a sufficient number of nucleotide bases to be used in a PCR reaction. A short oligonucleotide sequence may be based on, or designed from, a genomic or cDNA  
10 sequence and is used to amplify, confirm, or reveal the presence of an identical, similar or complementary DNA or RNA in a particular cell or tissue. Oligonucleotides comprise portions of a nucleic acid sequence having about 10 nt, 50 nt, or 100 nt in length, preferably about 15 nt to 30 nt in length. In one embodiment, an oligonucleotide comprising a nucleic acid molecule less than 100 nt in length would further comprise at least 6 contiguous nucleotides of GenBank  
15 Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or a complement thereof. Oligonucleotides may be chemically synthesized and may be used as probes.

In another embodiment, an isolated nucleic acid molecule of the invention comprises a nucleic acid molecule that is a complement of the nucleotide sequences shown in GenBank  
20 Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or a portion of this nucleotide sequence. A nucleic acid molecule that is complementary to the nucleotide sequences shown in GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843 is one that is sufficiently complementary to the nucleotide sequences shown in GenBank Accession Numbers AF022649, AF073959-073989,  
25 AF127814-127907, and AF179716-179843 that it can hydrogen bond with little or no mismatches to the nucleotide sequences shown in GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, thereby forming a stable duplex.

As used herein, the term “complementary” refers to Watson-Crick or Hoogsteen base pairing between nucleotide units of a nucleic acid molecule, and the term “binding” means the physical or chemical interaction between two polypeptides or compounds or associated  
30 polypeptides or compounds or combinations thereof. Binding includes ionic, non-ionic, Von der

Waals, hydrophobic interactions, etc. A physical interaction can be either direct or indirect. Indirect interactions may be through or due to the effects of another polypeptide or compound. Direct binding refers to interactions that do not take place through, or due to, the effect of another polypeptide or compound, but instead are without other substantial chemical intermediates.

5 Moreover, the nucleic acid molecule of the invention can comprise only a portion of the nucleic acid sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, e.g., a fragment that can be used as a probe or primer, or a fragment encoding a biologically active portion of ORX. Fragments provided herein are defined as sequences of at least 6 (contiguous) nucleic acids or at least 4 (contiguous) amino acids, a length sufficient to allow for specific hybridization in the case of nucleic acids or for specific recognition of an epitope in the case of amino acids, respectively, and are at most some portion less than a full length sequence. Fragments may be derived from any contiguous portion of a nucleic acid or amino acid sequence of choice. Derivatives are nucleic acid sequences or amino acid sequences formed from the native compounds either directly or by modification or 10 partial substitution. Analogs are nucleic acid sequences or amino acid sequences that have a structure similar to, but not identical to, the native compound but differs from it in respect to certain components or side chains. Analogs may be synthetic or from a different evolutionary origin and may have a similar or opposite metabolic activity compared to wild type.

15

Derivatives and analogs may be full length or other than full length, if the derivative or 20 analog contains a modified nucleic acid or amino acid, as described below. Derivatives or analogs of the nucleic acids or proteins of the invention include, but are not limited to, molecules comprising regions that are substantially homologous to the nucleic acids or proteins of the invention, in various embodiments, by at least about 70%, 80%, 85%, 90%, 95%, 98%, or even 99% identity (with a preferred identity of 80-99%) over a nucleic acid or amino acid sequence of 25 identical size or when compared to an aligned sequence in which the alignment is done by a computer homology program known in the art, or whose encoding nucleic acid is capable of hybridizing to the complement of a sequence encoding the aforementioned proteins under stringent, moderately stringent, or low stringent conditions. See e.g. Ausubel, *et al.*, CURRENT PROTOCOLS IN MOLECULAR BIOLOGY, John Wiley & Sons, New York, NY, 1993, and below. An 30 exemplary program is the Gap program (Wisconsin Sequence Analysis Package, Version 8 for UNIX, Genetics Computer Group, University Research Park, Madison, WI) using the default

settings, which uses the algorithm of Smith and Waterman (Adv. Appl. Math., 1981, 2: 482-489, which is incorporated herein by reference in its entirety).

A “homologous nucleic acid sequence” or “homologous amino acid sequence,” or variations thereof, refer to sequences characterized by a homology at the nucleotide level or amino acid level as discussed above. Homologous nucleotide sequences encode those sequences coding for isoforms of an ORX polypeptide. Isoforms can be expressed in different tissues of the same organism as a result of, for example, alternative splicing of RNA. Alternatively, isoforms can be encoded by different genes. In the present invention, homologous nucleotide sequences include nucleotide sequences encoding for an ORX polypeptide of species other than humans, including, but not limited to, mammals, and thus can include, *e.g.*, mouse, rat, rabbit, dog, cat 5 cow, horse, and other organisms. Homologous nucleotide sequences also include, but are not limited to, naturally occurring allelic variations and mutations of the nucleotide sequences set forth herein. A homologous nucleotide sequence does not, however, include the nucleotide sequence encoding human ORX protein. Homologous nucleic acid sequences include those nucleic acid sequences that encode conservative amino acid substitutions (see below) in the amino acid sequence of an ORX polypeptide, as well as a polypeptide having ORX activity. 10 Biological activities of the ORX proteins are described below. A homologous amino acid sequence does not encode the amino acid sequence of a human ORX polypeptide.

The nucleotide sequence determined from the cloning of the human ORX gene allows for 20 the generation of probes and primers designed for use in identifying and/or cloning ORX homologues in other cell types, *e.g.*, from other tissues, as well as ORX homologues from other mammals. The probe/primer typically comprises a substantially purified oligonucleotide. The oligonucleotide typically comprises a region of nucleotide sequence that hybridizes under stringent conditions to at least about 12, 25, 50, 100, 150, 200, 250, 300, 350 or 400 or more 25 consecutive sense strand nucleotide sequences of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843; or an anti-sense strand nucleotide sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843; or of a naturally occurring mutant of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843.

30 Probes based on the human ORX nucleotide sequence can be used to detect transcripts or genomic sequences encoding the same or homologous proteins. In various embodiments, the

probe further comprises a label group attached thereto, *e.g.*, the label group can be a radioisotope, a fluorescent compound, an enzyme, or an enzyme co-factor. Such probes can be used as a part of a diagnostic test kit for identifying cells or tissue which misexpress an ORX protein, such as by measuring a level of an ORX-encoding nucleic acid in a sample of cells from a subject *e.g.*, 5 detecting ORX mRNA levels or determining whether a genomic ORX gene has been mutated or deleted.

A "polypeptide having a biologically active portion of ORX" refers to polypeptides exhibiting activity similar, but not necessarily identical to, an activity of a polypeptide of the present invention, including mature forms, as measured in a particular biological assay, with or 10 without dose dependency. A nucleic acid fragment encoding a "biologically active portion of ORX" can be prepared by isolating a portion of an ORX nucleic acid that encodes a polypeptide having an ORX biological activity (biological activities of the ORX proteins are described below), expressing the encoded portion of ORX protein (*e.g.*, by recombinant expression *in vitro*) and assessing the activity of the encoded portion of ORX. For example, a nucleic acid fragment 15 encoding a biologically active portion of ORX can optionally include an ATP-binding domain. In another embodiment, a nucleic acid fragment encoding a biologically active portion of ORX includes one or more regions.

### **ORX Variants**

20 The invention further encompasses nucleic acid molecules that differ from the nucleotide sequences shown in GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843 due to the degeneracy of the genetic code. These nucleic acid molecules thus encode the same ORX protein as that encoded by the nucleotide sequences shown 25 in GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843 *e.g.*, the ORX polypeptides.

In addition to the human ORX nucleic acids, it will be appreciated by those skilled in the art that DNA sequence polymorphisms that lead to changes in the amino acid sequences of ORX may exist within a population (*e.g.*, the human population). Such genetic polymorphism in the ORX gene may exist among individuals within a population due to natural allelic variation. As 30 used herein, the terms "gene" and "recombinant gene" refer to nucleic acid molecules comprising an open reading frame encoding an ORX protein, preferably a mammalian ORX protein. Such

natural allelic variations can typically result in 1-5% variance in the nucleotide sequence of the ORX gene. Any and all such nucleotide variations and resulting amino acid polymorphisms in ORX that are the result of natural allelic variation and that do not alter the functional activity of ORX are intended to be within the scope of the invention.

5 Moreover, nucleic acid molecules encoding ORX proteins from other species, and thus  
that have a nucleotide sequence that differs from the human sequence of the ORX nucleic acid  
molecules are intended to be within the scope of the invention. Nucleic acid molecules  
corresponding to natural allelic variants and homologues of the ORX cDNAs of the invention  
can be isolated based on their homology to the human ORX nucleic acids disclosed herein using  
10 the human cDNAs, or a portion thereof, as a hybridization probe according to standard  
hybridization techniques under stringent hybridization conditions. For example, a soluble human  
ORX cDNA can be isolated based on its homology to human membrane-bound ORX. Likewise,  
a membrane-bound human ORX cDNA can be isolated based on its homology to soluble human  
ORX.

15 Accordingly, in another embodiment, an isolated nucleic acid molecule of the invention is  
at least 6 nucleotides in length and hybridizes under stringent conditions to the nucleic acid  
molecule comprising the nucleotide sequence of GenBank Accession Numbers AF022649,  
AF073959-073989, AF127814-127907, and AF179716-179843. In another embodiment, the  
nucleic acid is at least 10, 25, 50, 100, 250, 500 or 750 nucleotides in length. In another  
20 embodiment, an isolated nucleic acid molecule of the invention hybridizes to the coding region.  
As used herein, the term "hybridizes under stringent conditions" is intended to describe  
conditions for hybridization and washing under which nucleotide sequences at least 60%  
homologous to each other typically remain hybridized to each other.

25 Homologs (*i.e.*, nucleic acids encoding ORX proteins derived from species other than  
human) or other related sequences (*e.g.*, paralogs) can be obtained by low, moderate or high  
stringency hybridization with all or a portion of the particular human sequence as a probe using  
methods well known in the art for nucleic acid hybridization and cloning.

30 As used herein, the phrase "stringent hybridization conditions" refers to conditions under  
which a probe, primer or oligonucleotide will hybridize to its target sequence, but to no other  
sequences. Stringent conditions are sequence-dependent and will be different in different  
circumstances. Longer sequences hybridize specifically at higher temperatures than shorter

- sequences. Generally, stringent conditions are selected to be about 5 °C lower than the thermal melting point ( $T_m$ ) for the specific sequence at a defined ionic strength and pH. The  $T_m$  is the temperature (under defined ionic strength, pH and nucleic acid concentration) at which 50% of the probes complementary to the target sequence hybridize to the target sequence at equilibrium.
- 5 Since the target sequences are generally present at excess, at  $T_m$ , 50% of the probes are occupied at equilibrium. Typically, stringent conditions will be those in which the salt concentration is less than about 1.0 M sodium ion, typically about 0.01 to 1.0 M sodium ion (or other salts) at pH 7.0 to 8.3 and the temperature is at least about 30 °C for short probes, primers or oligonucleotides (e.g., 10 nt to 50 nt) and at least about 60°C for longer probes, primers and oligonucleotides.
- 10 Stringent conditions may also be achieved with the addition of destabilizing agents, such as formamide.

Stringent conditions are known to those skilled in the art and can be found in CURRENT PROTOCOLS IN MOLECULAR BIOLOGY, John Wiley & Sons, N.Y. (1989), 6.3.1-6.3.6. Preferably, the conditions are such that sequences at least about 65%, 70%, 75%, 85%, 90%, 95%, 98%, or 15 99% homologous to each other typically remain hybridized to each other. A non-limiting example of stringent hybridization conditions is hybridization in a high salt buffer comprising 6X SSC, 50 mM Tris-HCl (pH 7.5), 1 mM EDTA, 0.02% PVP, 0.02% Ficoll, 0.02% BSA, and 500 mg/ml denatured salmon sperm DNA at 65 °C. This hybridization is followed by one or more washes in 0.2X SSC, 0.01% BSA at 50 °C. An isolated nucleic acid molecule of the invention 20 that hybridizes under stringent conditions to the sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843 corresponds to a naturally occurring nucleic acid molecule. As used herein, a "naturally-occurring" nucleic acid molecule refers to an RNA or DNA molecule having a nucleotide sequence that occurs in nature (e.g., encodes a natural protein).

25 In a second embodiment, a nucleic acid sequence that is hybridizable to the nucleic acid molecule comprising the nucleotide sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or fragments, analogs or derivatives thereof, under conditions of moderate stringency is provided. A non-limiting example of moderate stringency hybridization conditions are hybridization in 6X SSC, 5X 30 Denhardt's solution, 0.5% SDS and 100 mg/ml denatured salmon sperm DNA at 55°C, followed by one or more washes in 1X SSC, 0.1% SDS at 37 °C. Other conditions of moderate stringency

that may be used are well known in the art. See, e.g., Ausubel *et al.* (eds.), 1993, CURRENT PROTOCOLS IN MOLECULAR BIOLOGY, John Wiley & Sons, NY, and Kriegler, 1990, GENE TRANSFER AND EXPRESSION, A LABORATORY MANUAL, Stockton Press, NY.

In a third embodiment, a nucleic acid that is hybridizable to the nucleic acid molecule comprising the nucleotide sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, or fragments, analogs or derivatives thereof, under conditions of low stringency, is provided. A non-limiting example of low stringency hybridization conditions are hybridization in 35% formamide, 5X SSC, 50 mM Tris-HCl (pH 7.5), 5 mM EDTA, 0.02% PVP, 0.02% Ficoll, 0.2% BSA, 100 mg/ml denatured salmon sperm DNA, 10% (wt/vol) dextran sulfate at 40 °C, followed by one or more washes in 2X SSC, 25 mM Tris-HCl (pH 7.4), 5 mM EDTA, and 0.1% SDS at 50 °C. Other conditions of low stringency that may be used are well known in the art (e.g., as employed for cross-species hybridizations). See, e.g., Ausubel *et al.* (eds.), 1993, CURRENT PROTOCOLS IN MOLECULAR BIOLOGY, John Wiley & Sons, NY, and Kriegler, 1990, GENE TRANSFER AND EXPRESSION, A LABORATORY MANUAL, Stockton Press, NY; Shilo and Weinberg, 1981, *Proc Natl Acad Sci USA* 78: 6789-6792.

### **Conservative mutations**

In addition to naturally-occurring allelic variants of the ORX sequence that may exist in the population, the skilled artisan will further appreciate that changes can be introduced by mutation into the nucleotide sequence of the ORX nucleic acid molecules, thereby leading to changes in the amino acid sequence of the encoded ORX protein, without altering the functional ability of the ORX protein. For example, nucleotide substitutions leading to amino acid substitutions at "non-essential" amino acid residues can be made in the sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843. A "non-essential" amino acid residue is a residue that can be altered from the wild-type sequence of ORX without altering the biological activity, whereas an "essential" amino acid residue is required for biological activity. For example, amino acid residues that are conserved among the ORX proteins of the present invention, are predicted to be particularly unamenable to alteration.

Another aspect of the invention pertains to nucleic acid molecules encoding ORX proteins that contain changes in amino acid residues that are not essential for activity. Such ORX

proteins differ in amino acid sequence from the ORX polypeptides, yet retain biological activity. In one embodiment, the isolated nucleic acid molecule comprises a nucleotide sequence encoding a protein, wherein the protein comprises an amino acid sequence at least about 75% homologous to the amino acid sequence of the ORX polypeptides. Preferably, the protein encoded by the  
5 nucleic acid is at least about 80% homologous to the sequence of an ORX polypeptide, more preferably at least about 90%, 95%, 98%, and most preferably at least about 99% homologous to the sequence of an ORX polypeptide.

An isolated nucleic acid molecule encoding an ORX protein homologous to the protein of can be created by introducing one or more nucleotide substitutions, additions or deletions into the  
10 nucleotide sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, such that one or more amino acid substitutions, additions or deletions are introduced into the encoded protein.

Mutations can be introduced into the nucleotide sequence of the ORX nucleic acid molecules by standard techniques, such as site-directed mutagenesis and PCR-mediated  
15 mutagenesis. Preferably, conservative amino acid substitutions are made at one or more predicted non-essential amino acid residues. A "conservative amino acid substitution" is one in which the amino acid residue is replaced with an amino acid residue having a similar side chain. Families of amino acid residues having similar side chains have been defined in the art. These families include amino acids with basic side chains (*e.g.*, lysine, arginine, histidine), acidic side  
20 chains (*e.g.*, aspartic acid, glutamic acid), uncharged polar side chains (*e.g.*, glycine, asparagine, glutamine, serine, threonine, tyrosine, cysteine), nonpolar side chains (*e.g.*, alanine, valine, leucine, isoleucine, proline, phenylalanine, methionine, tryptophan), beta-branched side chains (*e.g.*, threonine, valine, isoleucine) and aromatic side chains (*e.g.*, tyrosine, phenylalanine, tryptophan, histidine). Thus, a predicted nonessential amino acid residue in ORX is replaced  
25 with another amino acid residue from the same side chain family. Alternatively, in another embodiment, mutations can be introduced randomly along all or part of an ORX coding sequence, such as by saturation mutagenesis, and the resultant mutants can be screened for ORX biological activity to identify mutants that retain activity. Following mutagenesis of the ORX nucleic acid molecule, the encoded protein can be expressed by any recombinant technology  
30 known in the art and the activity of the protein can be determined.

In one embodiment, a mutant ORX protein can be assayed for (1) the ability to form protein:protein interactions with other ORX proteins, other cell-surface proteins, or biologically active portions thereof, (2) complex formation between a mutant ORX protein and an ORX receptor; (3) the ability of a mutant ORX protein to bind to an intracellular target protein or 5 biologically active portion thereof; (*e.g.*, avidin proteins); (4) the ability to bind ORX protein; or (5) the ability to specifically bind an anti-ORX protein antibody.

#### **Antisense ORX Nucleic Acids**

Another aspect of the invention pertains to isolated antisense nucleic acid molecules that 10 are hybridizable to or complementary to the nucleic acid molecule comprising the nucleotide sequence of the ORX nucleic acid molecule, or fragments, analogs or derivatives thereof. An "antisense" nucleic acid comprises a nucleotide sequence that is complementary to a "sense" nucleic acid encoding a protein, *e.g.*, complementary to the coding strand of a double-stranded cDNA molecule or complementary to an mRNA sequence. In specific aspects, antisense nucleic 15 acid molecules are provided that comprise a sequence complementary to at least about 10, 25, 50, 100, 250 or 500 nucleotides or an entire ORX coding strand, or to only a portion thereof. Nucleic acid molecules encoding fragments, homologs, derivatives and analogs of an ORX 20 protein or antisense nucleic acids complementary to an ORX nucleic acid sequence of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843 are additionally provided.

In one embodiment, an antisense nucleic acid molecule is antisense to a "coding region" of the coding strand of a nucleotide sequence encoding ORX. The term "coding region" refers to the region of the nucleotide sequence comprising codons which are translated into amino acid residues. In another embodiment, the antisense nucleic acid molecule is antisense to a 25 "noncoding region" of the coding strand of a nucleotide sequence encoding ORX. The term "noncoding region" refers to 5' and 3' sequences which flank the coding region that are not translated into amino acids (*i.e.*, also referred to as 5' and 3' untranslated regions).

Given the coding strand sequences encoding ORX disclosed herein, antisense nucleic acids of the invention can be designed according to the rules of Watson and Crick or Hoogsteen 30 base pairing. The antisense nucleic acid molecule can be complementary to the entire coding region of ORX mRNA, but more preferably is an oligonucleotide that is antisense to only a

portion of the coding or noncoding region of ORX mRNA. For example, the antisense oligonucleotide can be complementary to the region surrounding the translation start site of ORX mRNA. An antisense oligonucleotide can be, for example, about 5, 10, 15, 20, 25, 30, 35, 40, 45 or 50 nucleotides in length. An antisense nucleic acid of the invention can be constructed using

5 chemical synthesis or enzymatic ligation reactions using procedures known in the art. For example, an antisense nucleic acid (*e.g.*, an antisense oligonucleotide) can be chemically synthesized using naturally occurring nucleotides or variously modified nucleotides designed to increase the biological stability of the molecules or to increase the physical stability of the duplex formed between the antisense and sense nucleic acids, *e.g.*, phosphorothioate derivatives and

10 acridine substituted nucleotides can be used.

Examples of modified nucleotides that can be used to generate the antisense nucleic acid include: 5-fluorouracil, 5-bromouracil, 5-chlorouracil, 5-iodouracil, hypoxanthine, xanthine, 4-acetylcytosine, 5-(carboxyhydroxymethyl) uracil, 5-carboxymethylaminomethyl-2-thiouridine, 5-carboxymethylaminomethyluracil, dihydrouracil, beta-D-galactosylqueosine, inosine,

15 N6-isopentenyladenine, 1-methylguanine, 1-methylinosine, 2,2-dimethylguanine, 2-methyladenine, 2-methylguanine, 3-methylcytosine, 5-methylcytosine, N6-adenine, 7-methylguanine, 5-methylaminomethyluracil, 5-methoxyaminomethyl-2-thiouracil, beta-D-mannosylqueosine, 5'-methoxycarboxymethyluracil, 5-methoxyuracil, 2-methylthio-N6-isopentenyladenine, uracil-5-oxyacetic acid (v), wybutoxosine, pseudouracil,

20 queosine, 2-thiocytosine, 5-methyl-2-thiouracil, 2-thiouracil, 4-thiouracil, 5-methyluracil, uracil-5-oxyacetic acid methylester, uracil-5-oxyacetic acid (v), 5-methyl-2-thiouracil, 3-(3-amino-3-N-2-carboxypropyl) uracil, (acp3)w, and 2,6-diaminopurine. Alternatively, the antisense nucleic acid can be produced biologically using an expression vector into which a nucleic acid has been subcloned in an antisense orientation (*i.e.*, RNA transcribed from the

25 inserted nucleic acid will be of an antisense orientation to a target nucleic acid of interest, described further in the following subsection).

The antisense nucleic acid molecules of the invention are typically administered to a subject or generated *in situ* such that they hybridize with or bind to cellular mRNA and/or genomic DNA encoding an ORX protein to thereby inhibit expression of the protein, *e.g.*, by inhibiting transcription and/or translation. The hybridization can be by conventional nucleotide complementarity to form a stable duplex, or, for example, in the case of an antisense nucleic acid

molecule that binds to DNA duplexes, through specific interactions in the major groove of the double helix. An example of a route of administration of antisense nucleic acid molecules of the invention includes direct injection at a tissue site. Alternatively, antisense nucleic acid molecules can be modified to target selected cells and then administered systemically. For example, for  
5 systemic administration, antisense molecules can be modified such that they specifically bind to receptors or antigens expressed on a selected cell surface, e.g., by linking the antisense nucleic acid molecules to peptides or antibodies that bind to cell surface receptors or antigens. The antisense nucleic acid molecules can also be delivered to cells using the vectors described herein.  
10 To achieve sufficient intracellular concentrations of antisense molecules, vector constructs in which the antisense nucleic acid molecule is placed under the control of a strong pol II or pol III promoter are preferred.

In yet another embodiment, the antisense nucleic acid molecule of the invention is an α-anomeric nucleic acid molecule. An α-anomeric nucleic acid molecule forms specific double-stranded hybrids with complementary RNA in which, contrary to the usual β-units, the  
15 strands run parallel to each other (Gaultier *et al.* (1987) *Nucleic Acids Res* 15: 6625-6641). The antisense nucleic acid molecule can also comprise a 2'-o-methylribonucleotide (Inoue *et al.* (1987)  
*Nucleic Acids Res* 15: 6131-6148) or a chimeric RNA -DNA analogue (Inoue *et al.* (1987) *FEBS Lett* 215: 327-330).

Such modifications include, by way of nonlimiting example, modified bases, and nucleic  
20 acids whose sugar phosphate backbones are modified or derivatized. These modifications are carried out at least in part to enhance the chemical stability of the modified nucleic acid, such that they may be used, for example, as antisense binding nucleic acids in therapeutic applications in a subject.

## 25 ORX Ribozymes and PNA moieties

In still another embodiment, an antisense nucleic acid of the invention is a ribozyme. Ribozymes are catalytic RNA molecules with ribonuclease activity that are capable of cleaving a single-stranded nucleic acid, such as a mRNA, to which they have a complementary region. Thus, ribozymes (e.g., hammerhead ribozymes (described in Haselhoff and Gerlach (1988)  
30 *Nature* 334:585-591)) can be used to catalytically cleave ORX mRNA transcripts to thereby inhibit translation of ORX mRNA. A ribozyme having specificity for an ORX-encoding nucleic

acid can be designed based upon the nucleotide sequence of an ORX DNA disclosed herein. For example, a derivative of a Tetrahymena L-19 IVS RNA can be constructed in which the nucleotide sequence of the active site is complementary to the nucleotide sequence to be cleaved in an ORX-encoding mRNA. See, e.g., Cech *et al.* U.S. Pat. No. 4,987,071; and Cech *et al.* U.S. Pat. No. 5,116,742. Alternatively, ORX mRNA can be used to select a catalytic RNA having a specific ribonuclease activity from a pool of RNA molecules. See, e.g., Bartel *et al.*, (1993) *Science* 261:1411-1418.

Alternatively, ORX gene expression can be inhibited by targeting nucleotide sequences complementary to the regulatory region of the ORX (e.g., the ORX promoter and/or enhancers) to form triple helical structures that prevent transcription of the ORX gene in target cells. See generally, Helene. (1991) *Anticancer Drug Des.* 6: 569-84; Helene. *et al.* (1992) *Ann. N.Y. Acad. Sci.* 660:27-36; and Maher (1992) *Bioassays* 14: 807-15.

In various embodiments, the nucleic acids of ORX can be modified at the base moiety, sugar moiety or phosphate backbone to improve, e.g., the stability, hybridization, or solubility of the molecule. For example, the deoxyribose phosphate backbone of the nucleic acids can be modified to generate peptide nucleic acids (see Hyrup *et al.* (1996) *Bioorg Med Chem* 4: 5-23). As used herein, the terms "peptide nucleic acids" or "PNAs" refer to nucleic acid mimics, e.g., DNA mimics, in which the deoxyribose phosphate backbone is replaced by a pseudopeptide backbone and only the four natural nucleobases are retained. The neutral backbone of PNAs has been shown to allow for specific hybridization to DNA and RNA under conditions of low ionic strength. The synthesis of PNA oligomers can be performed using standard solid phase peptide synthesis protocols as described in Hyrup *et al.* (1996) above; Perry-O'Keefe *et al.* (1996) *PNAS* 93: 14670-675.

PNAs of ORX can be used in therapeutic and diagnostic applications. For example, PNAs can be used as antisense or antigene agents for sequence-specific modulation of gene expression by, e.g., inducing transcription or translation arrest or inhibiting replication. PNAs of ORX can also be used, e.g., in the analysis of single base pair mutations in a gene by, e.g., PNA directed PCR clamping; as artificial restriction enzymes when used in combination with other enzymes, e.g., S1 nucleases (Hyrup B. (1996) above); or as probes or primers for DNA sequence and hybridization (Hyrup *et al.* (1996), above; Perry-O'Keefe (1996), above).

In another embodiment, PNAs of ORX can be modified, e.g., to enhance their stability or cellular uptake, by attaching lipophilic or other helper groups to PNA, by the formation of PNA-DNA chimeras, or by the use of liposomes or other techniques of drug delivery known in the art. For example, PNA-DNA chimeras of ORX can be generated that may combine the  
5 advantageous properties of PNA and DNA. Such chimeras allow DNA recognition enzymes, e.g., RNase H and DNA polymerases, to interact with the DNA portion while the PNA portion would provide high binding affinity and specificity. PNA-DNA chimeras can be linked using linkers of appropriate lengths selected in terms of base stacking, number of bonds between the nucleobases, and orientation (Hyrup (1996) above). The synthesis of PNA-DNA chimeras can be  
10 performed as described in Hyrup (1996) above and Finn *et al.* (1996) *Nucl Acids Res* 24: 3357-63. For example, a DNA chain can be synthesized on a solid support using standard phosphoramidite coupling chemistry, and modified nucleoside analogs, e.g., 5'-(4-methoxytrityl) amino-5'-deoxy-thymidine phosphoramidite, can be used between the PNA and the 5' end of DNA (Mag *et al.* (1989) *Nucl Acid Res* 17: 5973-88). PNA monomers are then coupled in a  
15 stepwise manner to produce a chimeric molecule with a 5' PNA segment and a 3' DNA segment (Finn *et al.* (1996) above). Alternatively, chimeric molecules can be synthesized with a 5' DNA segment and a 3' PNA segment. See, Petersen *et al.* (1975) *Bioorg Med Chem Lett* 5: 1119-1124.

In other embodiments, the oligonucleotide may include other appended groups such as  
20 peptides (e.g., for targeting host cell receptors *in vivo*), or agents facilitating transport across the cell membrane (see, e.g., Letsinger *et al.*, 1989, *Proc. Natl. Acad. Sci. U.S.A.* 86:6553-6556; Lemaitre *et al.*, 1987, *Proc. Natl. Acad. Sci.* 84:648-652; PCT Publication No. W088/09810) or the blood-brain barrier (see, e.g., PCT Publication No. W089/10134). In addition,  
25 oligonucleotides can be modified with hybridization triggered cleavage agents (See, e.g., Krol *et al.*, 1988, *BioTechniques* 6:958-976) or intercalating agents. (See, e.g., Zon, 1988, *Pharm. Res.* 5: 539-549). To this end, the oligonucleotide may be conjugated to another molecule, e.g., a peptide, a hybridization triggered cross-linking agent, a transport agent, a hybridization-triggered cleavage agent, etc.

An ORX polypeptide of the invention includes the ORX-like protein whose sequence is provided in GenBank Accession Nos. AF127814, AF127816-127819, AF127821-127824, AF127836-127837, AF127840, AF127845-127848, AF127851-127852, AF127857, AF127859, AF127861-127862, AF127865, AF127867-127868, AF127870-127872, AF127874-127884,  
5 AF127886, AF127888, AF127896-127904, AF127906-127907, AF179716-179717, AF179720-179728, AF179730-179737, AF179739-179746, AF179748-179750, AF179752, AF179755-179756, AF179758-179761, AF179766-179767, AF179770-179771, AF179773-179775, AF179777-179779, AF179784-179788, AF179790-179792, AF179794, AF179796-179799, AF179802-179811, AF179814, AF179816-179818, AF179820, AF179822-179832, AF179834-  
10 179839, AF179841-179843, and AF073959-073989. The invention also includes a mutant or variant protein any of whose residues may be changed from the corresponding residue of the ORX polypeptide while still encoding a protein that maintains its ORX-like activities and physiological functions, or a functional fragment thereof. In some embodiments, up to 20% or more of the residues may be so changed in the mutant or variant protein. In some embodiments, 15 the ORX polypeptide according to the invention is a mature polypeptide.

In general, an ORX -like variant that preserves ORX-like function includes any variant in which residues at a particular position in the sequence have been substituted by other amino acids, and further include the possibility of inserting an additional residue or residues between two residues of the parent protein as well as the possibility of deleting one or more residues from the parent sequence. Any amino acid substitution, insertion, or deletion is encompassed by the invention. In favorable circumstances, the substitution is a conservative substitution as defined above.  
20

One aspect of the invention pertains to isolated ORX proteins, and biologically active portions thereof, or derivatives, fragments, analogs or homologs thereof. Also provided are polypeptide fragments suitable for use as immunogens to raise anti-ORX antibodies. In one embodiment, native ORX proteins can be isolated from cells or tissue sources by an appropriate purification scheme using standard protein purification techniques. In another embodiment, ORX proteins are produced by recombinant DNA techniques. Alternative to recombinant expression, an ORX protein or polypeptide can be synthesized chemically using standard peptide synthesis techniques.  
25  
30

An "isolated" or "purified" protein or biologically active portion thereof is substantially free of cellular material or other contaminating proteins from the cell or tissue source from which the ORX protein is derived, or substantially free from chemical precursors or other chemicals when chemically synthesized. The language "substantially free of cellular material" includes

5 preparations of ORX protein in which the protein is separated from cellular components of the cells from which it is isolated or recombinantly produced. In one embodiment, the language "substantially free of cellular material" includes preparations of ORX protein having less than about 30% (by dry weight) of non-ORX protein (also referred to herein as a "contaminating protein"), more preferably less than about 20% of non-ORX protein, still more preferably less

10 than about 10% of non-ORX protein, and most preferably less than about 5% non-ORX protein. When the ORX protein or biologically active portion thereof is recombinantly produced, it is also preferably substantially free of culture medium, *i.e.*, culture medium represents less than about 20%, more preferably less than about 10%, and most preferably less than about 5% of the volume of the protein preparation.

15 The language "substantially free of chemical precursors or other chemicals" includes preparations of ORX protein in which the protein is separated from chemical precursors or other chemicals that are involved in the synthesis of the protein. In one embodiment, the language "substantially free of chemical precursors or other chemicals" includes preparations of ORX protein having less than about 30% (by dry weight) of chemical precursors or non-ORX chemicals, more preferably less than about 20% chemical precursors or non-ORX chemicals, still more preferably less than about 10% chemical precursors or non-ORX chemicals, and most preferably less than about 5% chemical precursors or non-ORX chemicals.

20

Biologically active portions of an ORX protein include peptides comprising amino acid sequences sufficiently homologous to or derived from the amino acid sequence of the ORX protein, *e.g.*, the amino acid sequence of the ORX polypeptides that include fewer amino acids than the full length ORX proteins, and exhibit at least one activity of an ORX protein. Typically, biologically active portions comprise a domain or motif with at least one activity of the ORX protein. A biologically active portion of an ORX protein can be a polypeptide which is, for example, 10, 25, 50, 100 or more amino acids in length.

30 In some embodiments, an ORX protein of the invention includes the amino acid sequence of the herein described polypeptide and a number of amino acids on the amino terminus of the

ORX protein, the carboxy terminus if the ORX protein, or a number of amino acids on both termini of the disclosed ORX protein. Thus, the ORX protein can include 1, 2, 3, 4, 5, 10, 15, 20, 25, 50, or 75 or more amino acids on the amino terminus, the carboxy terminus, or both termini of the disclosed amino acid sequence.

5 A biologically active portion of an ORX protein of the present invention may contain at least one of the above-identified domains conserved between the ORX proteins, e.g. TSR modules. Moreover, other biologically active portions, in which other regions of the protein are deleted, can be prepared by recombinant techniques and evaluated for one or more of the functional activities of a native ORX protein.

10 In an embodiment, the ORX protein has an amino acid sequence of an ORX polypeptides. In other embodiments, the ORX protein is substantially homologous to an ORX polypeptide and retains the functional activity of the ORX polypeptide yet differs in amino acid sequence due to natural allelic variation or mutagenesis, as described in detail below. Accordingly, in another embodiment, the ORX protein is a protein that comprises an amino acid sequence at least about 15 45% homologous to the amino acid sequence of an ORX polypeptide and retains the functional activity of the ORX polypeptides.

#### **Determining homology between two or more sequence**

To determine the percent homology of two amino acid sequences or of two nucleic acids, 20 the sequences are aligned for optimal comparison purposes (e.g., gaps can be introduced in either of the sequences being compared for optimal alignment between the sequences). The amino acid residues or nucleotides at corresponding amino acid positions or nucleotide positions are then compared. When a position in the first sequence is occupied by the same amino acid residue or nucleotide as the corresponding position in the second sequence, then the molecules are 25 homologous at that position (*i.e.*, as used herein amino acid or nucleic acid "homology" is equivalent to amino acid or nucleic acid "identity").

The nucleic acid sequence homology may be determined as the degree of identity between two sequences. The homology may be determined using computer programs known in the art, such as GAP software provided in the GCG program package. See, *Needleman and Wunsch* 30 1970 *J Mol Biol* 48: 443-453. Using GCG GAP software with the following settings for nucleic acid sequence comparison: GAP creation penalty of 5.0 and GAP extension penalty of 0.3, the

coding region of the analogous nucleic acid sequences referred to above exhibits a degree of identity preferably of at least 70%, 75%, 80%, 85%, 90%, 95%, 98%, or 99%, with the CDS (encoding) part of the DNA sequence shown in GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843.

5       The term "sequence identity" refers to the degree to which two polynucleotide or polypeptide sequences are identical on a residue-by-residue basis over a particular region of comparison. The term "percentage of sequence identity" is calculated by comparing two optimally aligned sequences over that region of comparison, determining the number of positions at which the identical nucleic acid base (*e.g.*, A, T, C, G, U, or I, in the case of nucleic acids)

10      occurs in both sequences to yield the number of matched positions, dividing the number of matched positions by the total number of positions in the region of comparison (*i.e.*, the window size), and multiplying the result by 100 to yield the percentage of sequence identity. The term "substantial identity" as used herein denotes a characteristic of a polynucleotide sequence, wherein the polynucleotide comprises a sequence that has at least 80 percent sequence identity,

15      preferably at least 85 percent identity and often 90 to 95 percent sequence identity, more usually at least 99 percent sequence identity as compared to a reference sequence over a comparison region. The term "percentage of positive residues" is calculated by comparing two optimally aligned sequences over that region of comparison, determining the number of positions at which the identical and conservative amino acid substitutions, as defined above, occur in both

20      sequences to yield the number of matched positions, dividing the number of matched positions by the total number of positions in the region of comparison (*i.e.*, the window size), and multiplying the result by 100 to yield the percentage of positive residues.

### **Chimeric and fusion proteins**

25      The invention also provides ORX chimeric or fusion proteins. As used herein, an ORX "chimeric protein" or "fusion protein" comprises an ORX polypeptide operatively linked to a non-ORX polypeptide. An "ORX polypeptide" refers to a polypeptide having an amino acid sequence corresponding to ORX, whereas a "non-ORX polypeptide" refers to a polypeptide having an amino acid sequence corresponding to a protein that is not substantially homologous to the ORX protein, *e.g.*, a protein that is different from the ORX protein and that is derived from the same or a different organism. Within an ORX fusion protein the ORX polypeptide can

correspond to all or a portion of an ORX protein. In one embodiment, an ORX fusion protein comprises at least one biologically active portion of an ORX protein. In another embodiment, an ORX fusion protein comprises at least two biologically active portions of an ORX protein. Within the fusion protein, the term "operatively linked" is intended to indicate that the ORX polypeptide and the non-ORX polypeptide are fused in-frame to each other. The non-ORX polypeptide can be fused to the N-terminus or C-terminus of the ORX polypeptide.

5

For example, in one embodiment an ORX fusion protein comprises an ORX polypeptide operably linked to the extracellular domain of a second protein. Such fusion proteins can be further utilized in screening assays for compounds that modulate ORX activity (such assays are 10 described in detail below).

In another embodiment, the fusion protein is a GST-ORX fusion protein in which the ORX sequences are fused to the C-terminus of the GST (*i.e.*, glutathione S-transferase) sequences. Such fusion proteins can facilitate the purification of recombinant ORX.

In another embodiment, the fusion protein is an ORX-immunoglobulin fusion protein in 15 which the ORX sequences comprising one or more domains are fused to sequences derived from a member of the immunoglobulin protein family. The ORX-immunoglobulin fusion proteins of the invention can be incorporated into pharmaceutical compositions and administered to a subject to inhibit an interaction between an ORX ligand and an ORX protein on the surface of a cell, to thereby suppress ORX-mediated signal transduction *in vivo*. In one nonlimiting example, a 20 contemplated ORX ligand of the invention is the ORX receptor. The ORX-immunoglobulin fusion proteins can be used to affect the bioavailability of an ORX cognate ligand. Inhibition of the ORX ligand/ORX interaction may be useful therapeutically for both the treatment of proliferative and differentiative disorders, *e.g.*, cancer as well as modulating (*e.g.*, promoting or inhibiting) cell survival. Moreover, the ORX-immunoglobulin fusion proteins of the invention 25 can be used as immunogens to produce anti-ORX antibodies in a subject, to purify ORX ligands, and in screening assays to identify molecules that inhibit the interaction of ORX with an ORX ligand.

An ORX chimeric or fusion protein of the invention can be produced by standard 30 recombinant DNA techniques. For example, DNA fragments coding for the different polypeptide sequences are ligated together in-frame in accordance with conventional techniques, *e.g.*, by employing blunt-ended or stagger-ended termini for ligation, restriction enzyme digestion

to provide for appropriate termini, filling-in of cohesive ends as appropriate, alkaline phosphatase treatment to avoid undesirable joining, and enzymatic ligation. In another embodiment, the fusion gene can be synthesized by conventional techniques including automated DNA synthesizers. Alternatively, PCR amplification of gene fragments can be carried out using 5 anchor primers that give rise to complementary overhangs between two consecutive gene fragments that can subsequently be annealed and reamplified to generate a chimeric gene sequence (see, for example, Ausubel et al. (eds.) CURRENT PROTOCOLS IN MOLECULAR BIOLOGY, John Wiley & Sons, 1992). Moreover, many expression vectors are commercially available that already encode a fusion moiety (*e.g.*, a GST polypeptide). An ORX-encoding nucleic acid can be 10 cloned into such an expression vector such that the fusion moiety is linked in-frame to the ORX protein.

### **ORX agonists and antagonists**

The present invention also pertains to variants of the ORX proteins that function as either 15 ORX agonists (mimetics) or as ORX antagonists. Variants of the ORX protein can be generated by mutagenesis, *e.g.*, discrete point mutation or truncation of the ORX protein. An agonist of the ORX protein can retain substantially the same, or a subset of, the biological activities of the naturally occurring form of the ORX protein. An antagonist of the ORX protein can inhibit one or more of the activities of the naturally occurring form of the ORX protein by, for example, 20 competitively binding to a downstream or upstream member of a cellular signaling cascade which includes the ORX protein. Thus, specific biological effects can be elicited by treatment with a variant of limited function. In one embodiment, treatment of a subject with a variant having a subset of the biological activities of the naturally occurring form of the protein has fewer side effects in a subject relative to treatment with the naturally occurring form of the ORX 25 proteins.

Variants of the ORX protein that function as either ORX agonists (mimetics) or as ORX antagonists can be identified by screening combinatorial libraries of mutants, *e.g.*, truncation mutants, of the ORX protein for ORX protein agonist or antagonist activity. In one embodiment, a variegated library of ORX variants is generated by combinatorial mutagenesis at the nucleic 30 acid level and is encoded by a variegated gene library. A variegated library of ORX variants can be produced by, for example, enzymatically ligating a mixture of synthetic oligonucleotides into

gene sequences such that a degenerate set of potential ORX sequences is expressible as individual polypeptides, or alternatively, as a set of larger fusion proteins (e.g., for phage display) containing the set of ORX sequences therein. There are a variety of methods which can be used to produce libraries of potential ORX variants from a degenerate oligonucleotide sequence.

- 5      Chemical synthesis of a degenerate gene sequence can be performed in an automatic DNA synthesizer, and the synthetic gene then ligated into an appropriate expression vector. Use of a degenerate set of genes allows for the provision, in one mixture, of all of the sequences encoding the desired set of potential ORX sequences. Methods for synthesizing degenerate oligonucleotides are known in the art (see, e.g., Narang (1983) *Tetrahedron* 39:3; Itakura *et al.*
- 10     (1984) *Annu Rev Biochem* 53:323; Itakura *et al.* (1984) *Science* 198:1056; Ike *et al.* (1983) *Nucl Acid Res* 11:477.

### Polypeptide libraries

- In addition, libraries of fragments of the ORX protein coding sequence can be used to generate a variegated population of ORX fragments for screening and subsequent selection of variants of an ORX protein. In one embodiment, a library of coding sequence fragments can be generated by treating a double stranded PCR fragment of an ORX coding sequence with a nuclease under conditions wherein nicking occurs only about once per molecule, denaturing the double stranded DNA, renaturing the DNA to form double stranded DNA that can include sense/antisense pairs from different nicked products, removing single stranded portions from reformed duplexes by treatment with S1 nuclease, and ligating the resulting fragment library into an expression vector. By this method, an expression library can be derived which encodes N-terminal and internal fragments of various sizes of the ORX protein.

- Several techniques are known in the art for screening gene products of combinatorial libraries made by point mutations or truncation, and for screening cDNA libraries for gene products having a selected property. Such techniques are adaptable for rapid screening of the gene libraries generated by the combinatorial mutagenesis of ORX proteins. The most widely used techniques, which are amenable to high throughput analysis, for screening large gene libraries typically include cloning the gene library into replicable expression vectors, transforming appropriate cells with the resulting library of vectors, and expressing the combinatorial genes under conditions in which detection of a desired activity facilitates isolation

of the vector encoding the gene whose product was detected. Recursive ensemble mutagenesis (REM), a new technique that enhances the frequency of functional mutants in the libraries, can be used in combination with the screening assays to identify ORX variants (Arkin and Yourvan (1992) PNAS 89:7811-7815; Delgrave *et al.* (1993) Protein Engineering 6:327-331).

5

### **ORX Antibodies**

Also included in the invention are antibodies to ORX proteins, or fragments of ORX proteins. The term "antibody" as used herein refers to immunoglobulin molecules and immunologically active portions of immunoglobulin (Ig) molecules, *i.e.*, molecules that contain an antigen binding site that specifically binds (immunoreacts with) an antigen. Such antibodies include, but are not limited to, polyclonal, monoclonal, chimeric, single chain, F<sub>ab</sub>, F<sub>ab'</sub> and F<sub>(ab')2</sub> fragments, and an F<sub>ab</sub> expression library. In general, an antibody molecule obtained from humans relates to any of the classes IgG, IgM, IgA, IgE and IgD, which differ from one another by the nature of the heavy chain present in the molecule. Certain classes have subclasses as well, such as IgG<sub>1</sub>, IgG<sub>2</sub>, and others. Furthermore, in humans, the light chain may be a kappa chain or a lambda chain. Reference herein to antibodies includes a reference to all such classes, subclasses and types of human antibody species.

An isolated ORX-related protein of the invention may be intended to serve as an antigen, or a portion or fragment thereof, and additionally can be used as an immunogen to generate antibodies that immunospecifically bind the antigen, using standard techniques for polyclonal and monoclonal antibody preparation. The full-length protein can be used or, alternatively, the invention provides antigenic peptide fragments of the antigen for use as immunogens. An antigenic peptide fragment comprises at least 6 amino acid residues of the amino acid sequence of the full length protein and encompasses an epitope thereof such that an antibody raised against the peptide forms a specific immune complex with the full length protein or with any fragment that contains the epitope. Preferably, the antigenic peptide comprises at least 10 amino acid residues, or at least 15 amino acid residues, or at least 20 amino acid residues, or at least 30 amino acid residues. Preferred epitopes encompassed by the antigenic peptide are regions of the protein that are located on its surface; commonly these are hydrophilic regions.

In certain embodiments of the invention, at least one epitope encompassed by the antigenic peptide is a region of ORX-related protein that is located on the surface of the protein,

*e.g.*, a hydrophilic region. A hydrophobicity analysis of the human ORX-related protein sequence will indicate which regions of an ORX-related protein are particularly hydrophilic and, therefore, are likely to encode surface residues useful for targeting antibody production. As a means for targeting antibody production, hydropathy plots showing regions of hydrophilicity and

5 hydrophobicity may be generated by any method well known in the art, including, for example, the Kyte Doolittle or the Hopp Woods methods, either with or without Fourier transformation. See, *e.g.*, Hopp and Woods, 1981, *Proc. Nat. Acad. Sci. USA* 78: 3824-3828; Kyte and Doolittle 1982, *J. Mol. Biol.* 157: 105-142, each of which is incorporated herein by reference in its entirety. Antibodies that are specific for one or more domains within an antigenic protein, or

10 derivatives, fragments, analogs or homologs thereof, are also provided herein.

A protein of the invention, or a derivative, fragment, analog, homolog or ortholog thereof, may be utilized as an immunogen in the generation of antibodies that immunospecifically bind these protein components.

Various procedures known within the art may be used for the production of polyclonal or

15 monoclonal antibodies directed against a protein of the invention, or against derivatives, fragments, analogs homologs or orthologs thereof (see, for example, *Antibodies: A Laboratory Manual*, Harlow E, and Lane D, 1988, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY, incorporated herein by reference). Some of these antibodies are discussed below.

## 20 Polyclonal Antibodies

For the production of polyclonal antibodies, various suitable host animals (*e.g.*, rabbit, goat, mouse or other mammal) may be immunized by one or more injections with the native protein, a synthetic variant thereof, or a derivative of the foregoing. An appropriate immunogenic preparation can contain, for example, the naturally occurring immunogenic

25 protein, a chemically synthesized polypeptide representing the immunogenic protein, or a recombinantly expressed immunogenic protein. Furthermore, the protein may be conjugated to a second protein known to be immunogenic in the mammal being immunized. Examples of such immunogenic proteins include but are not limited to keyhole limpet hemocyanin, serum albumin, bovine thyroglobulin, and soybean trypsin inhibitor. The preparation can further include an

30 adjuvant. Various adjuvants used to increase the immunological response include, but are not limited to, Freund's (complete and incomplete), mineral gels (*e.g.*, aluminum hydroxide), surface

active substances (e.g., lysolecithin, pluronic polyols, polyanions, peptides, oil emulsions, dinitrophenol, etc.), adjuvants usable in humans such as Bacille Calmette-Guerin and Corynebacterium parvum, or similar immunostimulatory agents. Additional examples of adjuvants which can be employed include MPL-TDM adjuvant (monophosphoryl Lipid A, 5 synthetic trehalose dicorynomycolate).

The polyclonal antibody molecules directed against the immunogenic protein can be isolated from the mammal (e.g., from the blood) and further purified by well known techniques, such as affinity chromatography using protein A or protein G, which provide primarily the IgG fraction of immune serum. Subsequently, or alternatively, the specific antigen which is the target 10 of the immunoglobulin sought, or an epitope thereof, may be immobilized on a column to purify the immune specific antibody by immunoaffinity chromatography. Purification of immunoglobulins is discussed, for example, by D. Wilkinson (The Scientist, published by The Scientist, Inc., Philadelphia PA, Vol. 14, No. 8 (April 17, 2000), pp. 25-28).

## 15 **Monoclonal Antibodies**

The term "monoclonal antibody" (MAb) or "monoclonal antibody composition", as used herein, refers to a population of antibody molecules that contain only one molecular species of antibody molecule consisting of a unique light chain gene product and a unique heavy chain gene product. In particular, the complementarity determining regions (CDRs) of the monoclonal 20 antibody are identical in all the molecules of the population. MAbs thus contain an antigen binding site capable of immunoreacting with a particular epitope of the antigen characterized by a unique binding affinity for it.

Monoclonal antibodies can be prepared using hybridoma methods, such as those described by Kohler and Milstein, Nature, 256:495 (1975). In a hybridoma method, a mouse, 25 hamster, or other appropriate host animal, is typically immunized with an immunizing agent to elicit lymphocytes that produce or are capable of producing antibodies that will specifically bind to the immunizing agent. Alternatively, the lymphocytes can be immunized *in vitro*.

The immunizing agent will typically include the protein antigen, a fragment thereof or a fusion protein thereof. Generally, either peripheral blood lymphocytes are used if cells of human 30 origin are desired, or spleen cells or lymph node cells are used if non-human mammalian sources are desired. The lymphocytes are then fused with an immortalized cell line using a suitable

fusing agent, such as polyethylene glycol, to form a hybridoma cell (Goding, Monoclonal Antibodies: Principles and Practice, Academic Press, (1986) pp. 59-103). Immortalized cell lines are usually transformed mammalian cells, particularly myeloma cells of rodent, bovine and human origin. Usually, rat or mouse myeloma cell lines are employed. The hybridoma cells can be cultured in a suitable culture medium that preferably contains one or more substances that inhibit the growth or survival of the unfused, immortalized cells. For example, if the parental cells lack the enzyme hypoxanthine guanine phosphoribosyl transferase (HGPRT or HPRT), the culture medium for the hybridomas typically will include hypoxanthine, aminopterin, and thymidine ("HAT medium"), which substances prevent the growth of HGPRT-deficient cells.

Preferred immortalized cell lines are those that fuse efficiently, support stable high level expression of antibody by the selected antibody-producing cells, and are sensitive to a medium such as HAT medium. More preferred immortalized cell lines are murine myeloma lines, which can be obtained, for instance, from the Salk Institute Cell Distribution Center, San Diego, California and the American Type Culture Collection, Manassas, Virginia. Human myeloma and mouse-human heteromyeloma cell lines also have been described for the production of human monoclonal antibodies (Kozbor, J. Immunol., 133:3001 (1984); Brodeur et al., Monoclonal Antibody Production Techniques and Applications, Marcel Dekker, Inc., New York, (1987) pp. 51-63).

The culture medium in which the hybridoma cells are cultured can then be assayed for the presence of monoclonal antibodies directed against the antigen. Preferably, the binding specificity of monoclonal antibodies produced by the hybridoma cells is determined by immunoprecipitation or by an *in vitro* binding assay, such as radioimmunoassay (RIA) or enzyme-linked immunoabsorbent assay (ELISA). Such techniques and assays are known in the art. The binding affinity of the monoclonal antibody can, for example, be determined by the Scatchard analysis of Munson and Pollard, Anal. Biochem., 107:220 (1980). Preferably, antibodies having a high degree of specificity and a high binding affinity for the target antigen are isolated.

After the desired hybridoma cells are identified, the clones can be subcloned by limiting dilution procedures and grown by standard methods. Suitable culture media for this purpose include, for example, Dulbecco's Modified Eagle's Medium and RPMI-1640 medium. Alternatively, the hybridoma cells can be grown *in vivo* as ascites in a mammal.

The monoclonal antibodies secreted by the subclones can be isolated or purified from the culture medium or ascites fluid by conventional immunoglobulin purification procedures such as, for example, protein A-Sepharose, hydroxylapatite chromatography, gel electrophoresis, dialysis, or affinity chromatography.

5       The monoclonal antibodies can also be made by recombinant DNA methods, such as those described in U.S. Patent No. 4,816,567. DNA encoding the monoclonal antibodies of the invention can be readily isolated and sequenced using conventional procedures (*e.g.*, by using oligonucleotide probes that are capable of binding specifically to genes encoding the heavy and light chains of murine antibodies). The hybridoma cells of the invention serve as a preferred 10 source of such DNA. Once isolated, the DNA can be placed into expression vectors, which are then transfected into host cells such as simian COS cells, Chinese hamster ovary (CHO) cells, or myeloma cells that do not otherwise produce immunoglobulin protein, to obtain the synthesis of monoclonal antibodies in the recombinant host cells. The DNA also can be modified, for example, by substituting the coding sequence for human heavy and light chain constant domains 15 in place of the homologous murine sequences (U.S. Patent No. 4,816,567; Morrison, Nature 368, 812-13 (1994)) or by covalently joining to the immunoglobulin coding sequence all or part of the coding sequence for a non-immunoglobulin polypeptide. Such a non-immunoglobulin polypeptide can be substituted for the constant domains of an antibody of the invention, or can be substituted for the variable domains of one antigen-combining site of an antibody of the 20 invention to create a chimeric bivalent antibody.

### **Humanized Antibodies**

The antibodies directed against the protein antigens of the invention can further comprise humanized antibodies or human antibodies. These antibodies are suitable for administration to 25 humans without engendering an immune response by the human against the administered immunoglobulin. Humanized forms of antibodies are chimeric immunoglobulins, immunoglobulin chains or fragments thereof (such as Fv, Fab, Fab', F(ab')<sub>2</sub> or other antigen-binding subsequences of antibodies) that are principally comprised of the sequence of a human immunoglobulin, and contain minimal sequence derived from a non-human immunoglobulin. 30 Humanization can be performed following the method of Winter and co-workers (Jones et al., Nature, 321:522-525 (1986); Riechmann et al., Nature, 332:323-327 (1988); Verhoeyen et al.,

Science, 239:1534-1536 (1988)), by substituting rodent CDRs or CDR sequences for the corresponding sequences of a human antibody. (See also U.S. Patent No. 5,225,539.) In some instances, Fv framework residues of the human immunoglobulin are replaced by corresponding non-human residues. Humanized antibodies can also comprise residues which are found neither in the recipient antibody nor in the imported CDR or framework sequences. In general, the humanized antibody will comprise substantially all of at least one, and typically two, variable domains, in which all or substantially all of the CDR regions correspond to those of a non-human immunoglobulin and all or substantially all of the framework regions are those of a human immunoglobulin consensus sequence. The humanized antibody optimally also will comprise at least a portion of an immunoglobulin constant region (Fc), typically that of a human immunoglobulin (Jones et al., 1986; Riechmann et al., 1988; and Presta, Curr. Op. Struct. Biol., 2:593-596 (1992)).

### **Human Antibodies**

Fully human antibodies relate to antibody molecules in which essentially the entire sequences of both the light chain and the heavy chain, including the CDRs, arise from human genes. Such antibodies are termed "human antibodies", or "fully human antibodies" herein. Human monoclonal antibodies can be prepared by the trioma technique; the human B-cell hybridoma technique (see Kozbor, et al., 1983 Immunol Today 4: 72) and the EBV hybridoma technique to produce human monoclonal antibodies (see Cole, et al., 1985 In: MONOCLONAL ANTIBODIES AND CANCER THERAPY, Alan R. Liss, Inc., pp. 77-96). Human monoclonal antibodies may be utilized in the practice of the present invention and may be produced by using human hybridomas (see Cote, et al., 1983. Proc Natl Acad Sci USA 80: 2026-2030) or by transforming human B-cells with Epstein Barr Virus *in vitro* (see Cole, et al., 1985 In: MONOCLONAL ANTIBODIES AND CANCER THERAPY, Alan R. Liss, Inc., pp. 77-96).

In addition, human antibodies can also be produced using additional techniques, including phage display libraries (Hoogenboom and Winter, J. Mol. Biol., 227:381 (1991); Marks et al., J. Mol. Biol., 222:581 (1991)). Similarly, human antibodies can be made by introducing human immunoglobulin loci into transgenic animals, e.g., mice in which the endogenous immunoglobulin genes have been partially or completely inactivated. Upon challenge, human antibody production is observed, which closely resembles that seen in humans.

in all respects, including gene rearrangement, assembly, and antibody repertoire. This approach is described, for example, in U.S. Patent Nos. 5,545,807; 5,545,806; 5,569,825; 5,625,126; 5,633,425; 5,661,016, and in Marks et al. (Bio/Technology 10, 779-783 (1992)); Lonberg et al. (Nature 368 856-859 (1994)); Morrison (Nature 368, 812-13 (1994)); Fishwild et al., (Nature Biotechnology 14, 845-51 (1996)); Neuberger (Nature Biotechnology 14, 826 (1996)); and 5 Lonberg and Huszar (Intern. Rev. Immunol. 13 65-93 (1995)).

Human antibodies may additionally be produced using transgenic nonhuman animals which are modified so as to produce fully human antibodies rather than the animal's endogenous antibodies in response to challenge by an antigen. (See PCT publication WO94/02602). The 10 endogenous genes encoding the heavy and light immunoglobulin chains in the nonhuman host have been incapacitated, and active loci encoding human heavy and light chain immunoglobulins are inserted into the host's genome. The human genes are incorporated, for example, using yeast artificial chromosomes containing the requisite human DNA segments. An animal which provides all the desired modifications is then obtained as progeny by crossbreeding intermediate 15 transgenic animals containing fewer than the full complement of the modifications. The preferred embodiment of such a nonhuman animal is a mouse, and is termed the Xenomouse<sup>TM</sup> as disclosed in PCT publications WO 96/33735 and WO 96/34096. This animal produces B cells which secrete fully human immunoglobulins. The antibodies can be obtained directly from the animal after immunization with an immunogen of interest, as, for example, a preparation of a 20 polyclonal antibody, or alternatively from immortalized B cells derived from the animal, such as hybridomas producing monoclonal antibodies. Additionally, the genes encoding the immunoglobulins with human variable regions can be recovered and expressed to obtain the antibodies directly, or can be further modified to obtain analogs of antibodies such as, for example, single chain Fv molecules.

25 An example of a method of producing a nonhuman host, exemplified as a mouse, lacking expression of an endogenous immunoglobulin heavy chain is disclosed in U.S. Patent No. 5,939,598. It can be obtained by a method including deleting the J segment genes from at least one endogenous heavy chain locus in an embryonic stem cell to prevent rearrangement of the locus and to prevent formation of a transcript of a rearranged immunoglobulin heavy chain locus, 30 the deletion being effected by a targeting vector containing a gene encoding a selectable marker;

and producing from the embryonic stem cell a transgenic mouse whose somatic and germ cells contain the gene encoding the selectable marker.

A method for producing an antibody of interest, such as a human antibody, is disclosed in U.S. Patent No. 5,916,771. It includes introducing an expression vector that contains a nucleotide sequence encoding a heavy chain into one mammalian host cell in culture, introducing an expression vector containing a nucleotide sequence encoding a light chain into another mammalian host cell, and fusing the two cells to form a hybrid cell. The hybrid cell expresses an antibody containing the heavy chain and the light chain.

In a further improvement on this procedure, a method for identifying a clinically relevant epitope on an immunogen, and a correlative method for selecting an antibody that binds immunospecifically to the relevant epitope with high affinity, are disclosed in PCT publication WO 99/53049.

#### **F<sub>ab</sub> Fragments and Single Chain Antibodies**

According to the invention, techniques can be adapted for the production of single-chain antibodies specific to an antigenic protein of the invention (see e.g., U.S. Patent No. 4,946,778). In addition, methods can be adapted for the construction of F<sub>ab</sub> expression libraries (see e.g., Huse, et al., 1989 Science 246: 1275-1281) to allow rapid and effective identification of monoclonal F<sub>ab</sub> fragments with the desired specificity for a protein or derivatives, fragments, analogs or homologs thereof. Antibody fragments that contain the idiotypes to a protein antigen may be produced by techniques known in the art including, but not limited to: (i) an F<sub>(ab)2</sub> fragment produced by pepsin digestion of an antibody molecule; (ii) an F<sub>ab</sub> fragment generated by reducing the disulfide bridges of an F<sub>(ab)2</sub> fragment; (iii) an F<sub>ab</sub> fragment generated by the treatment of the antibody molecule with papain and a reducing agent and (iv) F<sub>v</sub> fragments.

#### **Bispecific Antibodies**

Bispecific antibodies are monoclonal, preferably human or humanized, antibodies that have binding specificities for at least two different antigens. In the present case, one of the binding specificities is for an antigenic protein of the invention. The second binding target is any other antigen, and advantageously is a cell-surface protein or receptor or receptor subunit.

Methods for making bispecific antibodies are known in the art. Traditionally, the recombinant production of bispecific antibodies is based on the co-expression of two immunoglobulin heavy-chain/light-chain pairs, where the two heavy chains have different specificities (Milstein and Cuello, *Nature*, 305:537-539 (1983)). Because of the random assortment of immunoglobulin heavy and light chains, these hybridomas (quadromas) produce a potential mixture of ten different antibody molecules, of which only one has the correct bispecific structure. The purification of the correct molecule is usually accomplished by affinity chromatography steps. Similar procedures are disclosed in WO 93/08829, published 13 May 1993, and in Traunecker *et al.*, 1991 *EMBO J.*, 10:3655-3659.

Antibody variable domains with the desired binding specificities (antibody-antigen combining sites) can be fused to immunoglobulin constant domain sequences. The fusion preferably is with an immunoglobulin heavy-chain constant domain, comprising at least part of the hinge, CH<sub>2</sub>, and CH<sub>3</sub> regions. It is preferred to have the first heavy-chain constant region (CH<sub>1</sub>) containing the site necessary for light-chain binding present in at least one of the fusions. DNAs encoding the immunoglobulin heavy-chain fusions and, if desired, the immunoglobulin light chain, are inserted into separate expression vectors, and are co-transfected into a suitable host organism. For further details of generating bispecific antibodies see, for example, Suresh et al., *Methods in Enzymology*, 121:210 (1986).

According to another approach described in WO 96/27011, the interface between a pair of antibody molecules can be engineered to maximize the percentage of heterodimers which are recovered from recombinant cell culture. The preferred interface comprises at least a part of the CH<sub>3</sub> region of an antibody constant domain. In this method, one or more small amino acid side chains from the interface of the first antibody molecule are replaced with larger side chains (e.g. tyrosine or tryptophan). Compensatory "cavities" of identical or similar size to the large side chain(s) are created on the interface of the second antibody molecule by replacing large amino acid side chains with smaller ones (e.g. alanine or threonine). This provides a mechanism for increasing the yield of the heterodimer over other unwanted end-products such as homodimers.

Bispecific antibodies can be prepared as full length antibodies or antibody fragments (e.g. F(ab')<sub>2</sub> bispecific antibodies). Techniques for generating bispecific antibodies from antibody fragments have been described in the literature. For example, bispecific antibodies can be prepared using chemical linkage. Brennan et al., *Science* 229:81 (1985) describe a procedure

wherein intact antibodies are proteolytically cleaved to generate F(ab')<sub>2</sub> fragments. These fragments are reduced in the presence of the dithiol complexing agent sodium arsenite to stabilize vicinal dithiols and prevent intermolecular disulfide formation. The Fab' fragments generated are then converted to thionitrobenzoate (TNB) derivatives. One of the Fab'-TNB derivatives is then reconverted to the Fab'-thiol by reduction with mercaptoethylamine and is mixed with an equimolar amount of the other Fab'-TNB derivative to form the bispecific antibody. The bispecific antibodies produced can be used as agents for the selective immobilization of enzymes.

Additionally, Fab' fragments can be directly recovered from E. coli and chemically coupled to form bispecific antibodies. Shalaby et al., J. Exp. Med. 175:217-225 (1992) describe the production of a fully humanized bispecific antibody F(ab')<sub>2</sub> molecule. Each Fab' fragment was separately secreted from E. coli and subjected to directed chemical coupling *in vitro* to form the bispecific antibody. The bispecific antibody thus formed was able to bind to cells overexpressing the ErbB2 receptor and normal human T cells, as well as trigger the lytic activity of human cytotoxic lymphocytes against human breast tumor targets.

Various techniques for making and isolating bispecific antibody fragments directly from recombinant cell culture have also been described. For example, bispecific antibodies have been produced using leucine zippers. Kostelny et al., J. Immunol. 148(5):1547-1553 (1992). The leucine zipper peptides from the Fos and Jun proteins were linked to the Fab' portions of two different antibodies by gene fusion. The antibody homodimers were reduced at the hinge region to form monomers and then re-oxidized to form the antibody heterodimers. This method can also be utilized for the production of antibody homodimers. The "diabody" technology described by Hollinger et al., Proc. Natl. Acad. Sci. USA 90:6444-6448 (1993) has provided an alternative mechanism for making bispecific antibody fragments. The fragments comprise a heavy-chain variable domain (V<sub>H</sub>) connected to a light-chain variable domain (V<sub>L</sub>) by a linker which is too short to allow pairing between the two domains on the same chain. Accordingly, the V<sub>H</sub> and V<sub>L</sub> domains of one fragment are forced to pair with the complementary V<sub>L</sub> and V<sub>H</sub> domains of another fragment, thereby forming two antigen-binding sites. Another strategy for making bispecific antibody fragments by the use of single-chain Fv (sFv) dimers has also been reported. See, Gruber et al., J. Immunol. 152:5368 (1994).

Antibodies with more than two valencies are contemplated. For example, trispecific antibodies can be prepared. Tutt et al., *J. Immunol.* 147:60 (1991).

Exemplary bispecific antibodies can bind to two different epitopes, at least one of which originates in the protein antigen of the invention. Alternatively, an anti-antigenic arm of an immunoglobulin molecule can be combined with an arm which binds to a triggering molecule on a leukocyte such as a T-cell receptor molecule (e.g. CD2, CD3, CD28, or B7), or Fc receptors for IgG (Fc?R), such as Fc?RI (CD64), Fc?RII (CD32) and Fc?RIII (CD16) so as to focus cellular defense mechanisms to the cell expressing the particular antigen. Bispecific antibodies can also be used to direct cytotoxic agents to cells which express a particular antigen. These antibodies possess an antigen-binding arm and an arm which binds a cytotoxic agent or a radionuclide chelator, such as EOTUBE, DPTA, DOTA, or TETA. Another bispecific antibody of interest binds the protein antigen described herein and further binds tissue factor (TF).

### **Heteroconjugate Antibodies**

Heteroconjugate antibodies are also within the scope of the present invention. Heteroconjugate antibodies are composed of two covalently joined antibodies. Such antibodies have, for example, been proposed to target immune system cells to unwanted cells (U.S. Patent No. 4,676,980), and for treatment of HIV infection (WO 91/00360; WO 92/200373; EP 03089). It is contemplated that the antibodies can be prepared *in vitro* using known methods in synthetic protein chemistry, including those involving crosslinking agents. For example, immunotoxins can be constructed using a disulfide exchange reaction or by forming a thioether bond. Examples of suitable reagents for this purpose include iminothiolate and methyl-4-mercaptoputyrimidate and those disclosed, for example, in U.S. Patent No. 4,676,980.

## **Effector Function Engineering**

It can be desirable to modify the antibody of the invention with respect to effector function, so as to enhance, *e.g.*, the effectiveness of the antibody in treating cancer. For example, cysteine residue(s) can be introduced into the Fc region, thereby allowing interchain disulfide bond formation in this region. The homodimeric antibody thus generated can have improved internalization capability and/or increased complement-mediated cell killing and antibody-dependent cellular cytotoxicity (ADCC). See Caron et al., *J. Exp Med.*, 176: 1191-1195 (1992) and Shope, *J. Immunol.*, 148: 2918-2922 (1992). Homodimeric antibodies with enhanced anti-tumor activity can also be prepared using heterobifunctional cross-linkers as described in Wolff et al. *Cancer Research*, 53: 2560-2565 (1993). Alternatively, an antibody can be engineered that has dual Fc regions and can thereby have enhanced complement lysis and ADCC capabilities. See Stevenson et al., *Anti-Cancer Drug Design*, 3: 219-230 (1989).

## **Immunoconjugates**

The invention also pertains to immunoconjugates comprising an antibody conjugated to a cytotoxic agent such as a chemotherapeutic agent, toxin (*e.g.*, an enzymatically active toxin of bacterial, fungal, plant, or animal origin, or fragments thereof), or a radioactive isotope (*i.e.*, a radioconjugate).

Chemotherapeutic agents useful in the generation of such immunoconjugates have been described above. Enzymatically active toxins and fragments thereof that can be used include diphtheria A chain, nonbinding active fragments of diphtheria toxin, exotoxin A chain (from *Pseudomonas aeruginosa*), ricin A chain, abrin A chain, modeccin A chain, alpha-sarcin, *Aleurites fordii* proteins, dianthin proteins, *Phytolaca americana* proteins (PAPI, PAPII, and PAP-S), *momordica charantia* inhibitor, curcin, crotin, *sapaonaria officinalis* inhibitor, gelonin, mitogellin, restrictocin, phenomycin, enomycin, and the trichothecenes. A variety of radionuclides are available for the production of radioconjugated antibodies. Examples include  $^{212}\text{Bi}$ ,  $^{131}\text{I}$ ,  $^{131}\text{In}$ ,  $^{90}\text{Y}$ , and  $^{186}\text{Re}$ .

Conjugates of the antibody and cytotoxic agent are made using a variety of bifunctional protein-coupling agents such as N-succinimidyl-3-(2-pyridylthiol) propionate (SPDP), iminothiolane (IT), bifunctional derivatives of imidoesters (such as dimethyl adipimidate HCL), active esters (such as disuccinimidyl suberate), aldehydes (such as glutaraldehyde), bis-azido

compounds (such as bis (p-azidobenzoyl) hexanediamine), bis-diazonium derivatives (such as bis-(p-diazoniumbenzoyl)-ethylenediamine), diisocyanates (such as tolyene 2,6-diisocyanate), and bis-active fluorine compounds (such as 1,5-difluoro-2,4-dinitrobenzene). For example, a ricin immunotoxin can be prepared as described in Vitetta et al., Science, 238: 1098 (1987).

5 Carbon-14-labeled 1-isothiocyanatobenzyl-3-methyldiethylene triaminepentaacetic acid (MX-DTPA) is an exemplary chelating agent for conjugation of radionucleotide to the antibody. See WO94/11026.

In another embodiment, the antibody can be conjugated to a "receptor" (such streptavidin) for utilization in tumor pretargeting wherein the antibody-receptor conjugate is administered to  
10 the patient, followed by removal of unbound conjugate from the circulation using a clearing agent and then administration of a "ligand" (e.g., avidin) that is in turn conjugated to a cytotoxic agent.

#### **ORX Recombinant Expression Vectors and Host Cells**

15 Another aspect of the invention pertains to vectors, preferably expression vectors, containing a nucleic acid encoding an ORX protein, or derivatives, fragments, analogs or homologs thereof. As used herein, the term "vector" refers to a nucleic acid molecule capable of transporting another nucleic acid to which it has been linked. One type of vector is a "plasmid", which refers to a circular double stranded DNA loop into which additional DNA segments can be  
20 ligated. Another type of vector is a viral vector, wherein additional DNA segments can be ligated into the viral genome. Certain vectors are capable of autonomous replication in a host cell into which they are introduced (e.g., bacterial vectors having a bacterial origin of replication and episomal mammalian vectors). Other vectors (e.g., non-episomal mammalian vectors) are integrated into the genome of a host cell upon introduction into the host cell, and thereby are  
25 replicated along with the host genome. Moreover, certain vectors are capable of directing the expression of genes to which they are operatively-linked. Such vectors are referred to herein as "expression vectors". In general, expression vectors of utility in recombinant DNA techniques are often in the form of plasmids. In the present specification, "plasmid" and "vector" can be used interchangeably as the plasmid is the most commonly used form of vector. However, the  
30 invention is intended to include such other forms of expression vectors, such as viral vectors

(e.g., replication defective retroviruses, adenoviruses and adeno-associated viruses), which serve equivalent functions.

The recombinant expression vectors of the invention comprise a nucleic acid of the invention in a form suitable for expression of the nucleic acid in a host cell, which means that the 5 recombinant expression vectors include one or more regulatory sequences, selected on the basis of the host cells to be used for expression, that is operatively-linked to the nucleic acid sequence to be expressed. Within a recombinant expression vector, "operably-linked" is intended to mean that the nucleotide sequence of interest is linked to the regulatory sequence(s) in a manner that allows for expression of the nucleotide sequence (e.g., in an *in vitro* transcription/translation 10 system or in a host cell when the vector is introduced into the host cell).

The term "regulatory sequence" is intended to includes promoters, enhancers and other expression control elements (e.g., polyadenylation signals). Such regulatory sequences are described, for example, in Goeddel, GENE EXPRESSION TECHNOLOGY: METHODS IN ENZYMOLOGY 185, Academic Press, San Diego, Calif. (1990). Regulatory sequences include those that direct 15 constitutive expression of a nucleotide sequence in many types of host cell and those that direct expression of the nucleotide sequence only in certain host cells (e.g., tissue-specific regulatory sequences). It will be appreciated by those skilled in the art that the design of the expression vector can depend on such factors as the choice of the host cell to be transformed, the level of expression of protein desired, etc. The expression vectors of the invention can be introduced 20 into host cells to thereby produce proteins or peptides, including fusion proteins or peptides, encoded by nucleic acids as described herein (e.g., ORX proteins, mutant forms of ORX proteins, fusion proteins, etc.).

The recombinant expression vectors of the invention can be designed for expression of ORX proteins in prokaryotic or eukaryotic cells. For example, ORX proteins can be expressed in 25 bacterial cells such as *Escherichia coli*, insect cells (using baculovirus expression vectors) yeast cells or mammalian cells. Suitable host cells are discussed further in Goeddel, GENE EXPRESSION TECHNOLOGY: METHODS IN ENZYMOLOGY 185, Academic Press, San Diego, Calif. (1990). Alternatively, the recombinant expression vector can be transcribed and translated *in vitro*, for example using T7 promoter regulatory sequences and T7 polymerase.

30 Expression of proteins in prokaryotes is most often carried out in *Escherichia coli* with vectors containing constitutive or inducible promoters directing the expression of either fusion or

non-fusion proteins. Fusion vectors add a number of amino acids to a protein encoded therein, usually to the amino terminus of the recombinant protein. Such fusion vectors typically serve three purposes: (i) to increase expression of recombinant protein; (ii) to increase the solubility of the recombinant protein; and (iii) to aid in the purification of the recombinant protein by acting 5 as a ligand in affinity purification. Often, in fusion expression vectors, a proteolytic cleavage site is introduced at the junction of the fusion moiety and the recombinant protein to enable separation of the recombinant protein from the fusion moiety subsequent to purification of the fusion protein. Such enzymes, and their cognate recognition sequences, include Factor Xa, thrombin and enterokinase. Typical fusion expression vectors include pGEX (Pharmacia Biotech 10 Inc; Smith and Johnson, 1988. *Gene* 67: 31-40), pMAL (New England Biolabs, Beverly, Mass.) and pRIT5 (Pharmacia, Piscataway, N.J.) that fuse glutathione S-transferase (GST), maltose E binding protein, or protein A, respectively, to the target recombinant protein.

15 Examples of suitable inducible non-fusion *E. coli* expression vectors include pTrc (Amrann *et al.*, (1988) *Gene* 69:301-315) and pET 11d (Studier *et al.*, GENE EXPRESSION TECHNOLOGY: METHODS IN ENZYMOLOGY 185, Academic Press, San Diego, Calif. (1990) 60-89).

One strategy to maximize recombinant protein expression in *E. coli* is to express the 20 protein in a host bacteria with an impaired capacity to proteolytically cleave the recombinant protein. See, e.g., Gottesman, GENE EXPRESSION TECHNOLOGY: METHODS IN ENZYMOLOGY 185, Academic Press, San Diego, Calif. (1990) 119-128. Another strategy is to alter the nucleic acid sequence of the nucleic acid to be inserted into an expression vector so that the individual codons for each amino acid are those preferentially utilized in *E. coli* (see, e.g., Wada, *et al.*, 1992. *Nucl. Acids Res.* 20: 2111-2118). Such alteration of nucleic acid sequences of the invention can be carried out by standard DNA synthesis techniques.

In another embodiment, the ORX expression vector is a yeast expression vector. 25 Examples of vectors for expression in yeast *Saccharomyces cerevisiae* include pYEpSec1 (Baldari, *et al.*, 1987. *EMBO J.* 6: 229-234), pMFa (Kurjan and Herskowitz, 1982. *Cell* 30: 933-943), pJRY88 (Schultz *et al.*, 1987. *Gene* 54: 113-123), pYES2 (Invitrogen Corporation, San Diego, Calif.), and picZ (InVitrogen Corp, San Diego, Calif.).

Alternatively, ORX can be expressed in insect cells using baculovirus expression vectors. 30 Baculovirus vectors available for expression of proteins in cultured insect cells (e.g., SF9 cells)

include the pAc series (Smith, *et al.*, 1983. *Mol. Cell. Biol.* 3: 2156-2165) and the pVL series (Lucklow and Summers, 1989. *Virology* 170: 31-39).

In yet another embodiment, a nucleic acid of the invention is expressed in mammalian cells using a mammalian expression vector. Examples of mammalian expression vectors include  
5 pCDM8 (Seed, 1987. *Nature* 329: 840) and pMT2PC (Kaufman, *et al.*, 1987. *EMBO J.* 6: 187-195). When used in mammalian cells, the expression vector's control functions are often provided by viral regulatory elements. For example, commonly used promoters are derived from polyoma, adenovirus 2, cytomegalovirus, and simian virus 40. For other suitable expression systems for both prokaryotic and eukaryotic cells see, *e.g.*, Chapters 16 and 17 of Sambrook, *et al.*, MOLECULAR CLONING: A LABORATORY MANUAL. 2nd ed., Cold Spring Harbor Laboratory,  
10 Cold Spring Harbor Laboratory Press, Cold Spring Harbor, N.Y., 1989.

In another embodiment, the recombinant mammalian expression vector is capable of directing expression of the nucleic acid preferentially in a particular cell type (*e.g.*, tissue-specific regulatory elements are used to express the nucleic acid). Tissue-specific regulatory elements are known in the art. Non-limiting examples of suitable tissue-specific promoters include the albumin promoter (liver-specific; Pinkert, *et al.*, 1987. *Genes Dev.* 1: 268-277), lymphoid-specific promoters (Calame and Eaton, 1988. *Adv. Immunol.* 43: 235-275), in particular promoters of T cell receptors (Winoto and Baltimore, 1989. *EMBO J.* 8: 729-733) and immunoglobulins (Banerji, *et al.*, 1983. *Cell* 33: 729-740; Queen and Baltimore, 1983. *Cell* 33: 15 741-748), neuron-specific promoters (*e.g.*, the neurofilament promoter; Byrne and Ruddle, 1989. *Proc. Natl. Acad. Sci. USA* 86: 5473-5477), pancreas-specific promoters (Edlund, *et al.*, 1985. *Science* 230: 912-916), and mammary gland-specific promoters (*e.g.*, milk whey promoter; U.S. Pat. No. 4,873,316 and European Application Publication No. 264,166). Developmentally-regulated promoters are also encompassed, *e.g.*, the murine hox promoters (Kessel and Gruss, 20 1990. *Science* 249: 374-379) and the  $\alpha$ -fetoprotein promoter (Campes and Tilghman, 1989. *Genes Dev.* 3: 537-546).

The invention further provides a recombinant expression vector comprising a DNA molecule of the invention cloned into the expression vector in an antisense orientation. That is, the DNA molecule is operatively-linked to a regulatory sequence in a manner that allows for expression (by transcription of the DNA molecule) of an RNA molecule that is antisense to ORX mRNA. Regulatory sequences operatively linked to a nucleic acid cloned in the antisense  
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orientation can be chosen that direct the continuous expression of the antisense RNA molecule in a variety of cell types, for instance viral promoters and/or enhancers, or regulatory sequences can be chosen that direct constitutive, tissue specific or cell type specific expression of antisense RNA. The antisense expression vector can be in the form of a recombinant plasmid, phagemid  
5 or attenuated virus in which antisense nucleic acids are produced under the control of a high efficiency regulatory region, the activity of which can be determined by the cell type into which the vector is introduced. For a discussion of the regulation of gene expression using antisense genes see, e.g., Weintraub, *et al.*, "Antisense RNA as a molecular tool for genetic analysis," *Reviews-Trends in Genetics*, Vol. 1(1) 1986.

10 Another aspect of the invention pertains to host cells into which a recombinant expression vector of the invention has been introduced. The terms "host cell" and "recombinant host cell" are used interchangeably herein. It is understood that such terms refer not only to the particular subject cell but also to the progeny or potential progeny of such a cell. Because certain modifications may occur in succeeding generations due to either mutation or environmental  
15 influences, such progeny may not, in fact, be identical to the parent cell, but are still included within the scope of the term as used herein.

A host cell can be any prokaryotic or eukaryotic cell. For example, ORX protein can be expressed in bacterial cells such as *E. coli*, insect cells, yeast or mammalian cells (such as human, Chinese hamster ovary cells (CHO) or COS cells). Other suitable host cells are known to  
20 those skilled in the art.

Vector DNA can be introduced into prokaryotic or eukaryotic cells via conventional transformation or transfection techniques. As used herein, the terms "transformation" and "transfection" are intended to refer to a variety of art-recognized techniques for introducing foreign nucleic acid (e.g., DNA) into a host cell, including calcium phosphate or calcium  
25 chloride co-precipitation, DEAE-dextran-mediated transfection, lipofection, or electroporation. Suitable methods for transforming or transfecting host cells can be found in Sambrook, *et al.* (**MOLECULAR CLONING: A LABORATORY MANUAL**. 2nd ed., Cold Spring Harbor Laboratory, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, N.Y., 1989), and other laboratory manuals.

For stable transfection of mammalian cells, it is known that, depending upon the  
30 expression vector and transfection technique used, only a small fraction of cells may integrate the foreign DNA into their genome. In order to identify and select these integrants, a gene that

encodes a selectable marker (*e.g.*, resistance to antibiotics) is generally introduced into the host cells along with the gene of interest. Various selectable markers include those that confer resistance to drugs, such as G418, hygromycin and methotrexate. Nucleic acid encoding a selectable marker can be introduced into a host cell on the same vector as that encoding ORX or 5 can be introduced on a separate vector. Cells stably transfected with the introduced nucleic acid can be identified by drug selection (*e.g.*, cells that have incorporated the selectable marker gene will survive, while the other cells die).

A host cell of the invention, such as a prokaryotic or eukaryotic host cell in culture, can be used to produce (*i.e.*, express) ORX protein. Accordingly, the invention further provides 10 methods for producing ORX protein using the host cells of the invention. In one embodiment, the method comprises culturing the host cell of invention (into which a recombinant expression vector encoding ORX protein has been introduced) in a suitable medium such that ORX protein is produced. In another embodiment, the method further comprises isolating ORX protein from the medium or the host cell.

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### **Transgenic ORX Animals**

The host cells of the invention can also be used to produce non-human transgenic animals. For example, in one embodiment, a host cell of the invention is a fertilized oocyte or an embryonic stem cell into which ORX protein-coding sequences have been introduced. Such host 20 cells can then be used to create non-human transgenic animals in which exogenous ORX sequences have been introduced into their genome or homologous recombinant animals in which endogenous ORX sequences have been altered. Such animals are useful for studying the function and/or activity of ORX protein and for identifying and/or evaluating modulators of ORX protein activity. As used herein, a "transgenic animal" is a non-human animal, preferably a 25 mammal, more preferably a rodent such as a rat or mouse, in which one or more of the cells of the animal includes a transgene. Other examples of transgenic animals include non-human primates, sheep, dogs, cows, goats, chickens, amphibians, etc. A transgene is exogenous DNA that is integrated into the genome of a cell from which a transgenic animal develops and that remains in the genome of the mature animal, thereby directing the expression of an encoded gene 30 product in one or more cell types or tissues of the transgenic animal. As used herein, a "homologous recombinant animal" is a non-human animal, preferably a mammal, more

preferably a mouse, in which an endogenous ORX gene has been altered by homologous recombination between the endogenous gene and an exogenous DNA molecule introduced into a cell of the animal, *e.g.*, an embryonic cell of the animal, prior to development of the animal.

A transgenic animal of the invention can be created by introducing ORX-encoding nucleic acid into the male pronuclei of a fertilized oocyte (*e.g.*, by microinjection, retroviral infection) and allowing the oocyte to develop in a pseudopregnant female foster animal. Sequences including GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843 can be introduced as a transgene into the genome of a non-human animal. Alternatively, a non-human homologue of the human ORX gene, such as a mouse ORX gene, can be isolated based on hybridization to the human ORX cDNA (described further *supra*) and used as a transgene. Intronic sequences and polyadenylation signals can also be included in the transgene to increase the efficiency of expression of the transgene. A tissue-specific regulatory sequence(s) can be operably-linked to the ORX transgene to direct expression of ORX protein to particular cells. Methods for generating transgenic animals via embryo manipulation and microinjection, particularly animals such as mice, have become conventional in the art and are described, for example, in U.S. Patent Nos. 4,736,866; 4,870,009; and 4,873,191; and Hogan, 1986. In: MANIPULATING THE MOUSE EMBRYO, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, N.Y. Similar methods are used for production of other transgenic animals. A transgenic founder animal can be identified based upon the presence of the ORX transgene in its genome and/or expression of ORX mRNA in tissues or cells of the animals. A transgenic founder animal can then be used to breed additional animals carrying the transgene. Moreover, transgenic animals carrying a transgene-encoding ORX protein can further be bred to other transgenic animals carrying other transgenes.

To create a homologous recombinant animal, a vector is prepared which contains at least a portion of an ORX gene into which a deletion, addition or substitution has been introduced to thereby alter, *e.g.*, functionally disrupt, the ORX gene. The ORX gene can be a human gene, but more preferably, is a non-human homologue of a human ORX gene. For example, a mouse homologue of human ORX gene of GenBank Accession Numbers AF022649, AF073959-073989, AF127814-127907, and AF179716-179843, can be used to construct a homologous recombination vector suitable for altering an endogenous ORX gene in the mouse genome. In one embodiment, the vector is designed such that, upon homologous recombination, the

endogenous ORX gene is functionally disrupted (*i.e.*, no longer encodes a functional protein; also referred to as a "knock out" vector).

Alternatively, the vector can be designed such that, upon homologous recombination, the endogenous ORX gene is mutated or otherwise altered but still encodes functional protein (*e.g.*, the upstream regulatory region can be altered to thereby alter the expression of the endogenous ORX protein). In the homologous recombination vector, the altered portion of the ORX gene is flanked at its 5'- and 3'-termini by additional nucleic acid of the ORX gene to allow for

homologous recombination to occur between the exogenous ORX gene carried by the vector and an endogenous ORX gene in an embryonic stem cell. The additional flanking ORX nucleic acid is of sufficient length for successful homologous recombination with the endogenous gene.

Typically, several kilobases of flanking DNA (both at the 5'- and 3'-termini) are included in the vector. *See, e.g.*, Thomas, *et al.*, 1987. *Cell* 51: 503 for a description of homologous recombination vectors. The vector is then introduced into an embryonic stem cell line (*e.g.*, by electroporation) and cells in which the introduced ORX gene has homologously-recombined with the endogenous ORX gene are selected. *See, e.g.*, Li, *et al.*, 1992. *Cell* 69: 915.

The selected cells are then injected into a blastocyst of an animal (*e.g.*, a mouse) to form aggregation chimeras. *See, e.g.*, Bradley, 1987. In: TERATOCARCINOMAS AND EMBRYONIC STEM CELLS: A PRACTICAL APPROACH, Robertson, ed. IRL, Oxford, pp. 113-152. A chimeric embryo can then be implanted into a suitable pseudopregnant female foster animal and the embryo

brought to term. Progeny harboring the homologously-recombined DNA in their germ cells can be used to breed animals in which all cells of the animal contain the homologously-recombined DNA by germline transmission of the transgene. Methods for constructing homologous recombination vectors and homologous recombinant animals are described further in Bradley, 1991. *Curr. Opin. Biotechnol.* 2: 823-829; PCT International Publication Nos.: WO 90/11354; WO 91/01140; WO 92/0968; and WO 93/04169.

In another embodiment, transgenic non-humans animals can be produced that contain selected systems that allow for regulated expression of the transgene. One example of such a system is the cre/loxP recombinase system of bacteriophage P1. For a description of the cre/loxP recombinase system, *See, e.g.*, Lakso, *et al.*, 1992. *Proc. Natl. Acad. Sci. USA* 89: 6232-6236.

Another example of a recombinase system is the FLP recombinase system of *Saccharomyces cerevisiae*. *See, O'Gorman, et al.*, 1991. *Science* 251:1351-1355. If a cre/loxP recombinase

system is used to regulate expression of the transgene, animals containing transgenes encoding both the Cre recombinase and a selected protein are required. Such animals can be provided through the construction of "double" transgenic animals, *e.g.*, by mating two transgenic animals, one containing a transgene encoding a selected protein and the other containing a transgene encoding a recombinase.

5 Clones of the non-human transgenic animals described herein can also be produced according to the methods described in Wilmut, *et al.*, 1997. *Nature* 385: 810-813. In brief, a cell (*e.g.*, a somatic cell) from the transgenic animal can be isolated and induced to exit the growth cycle and enter G<sub>0</sub> phase. The quiescent cell can then be fused, *e.g.*, through the use of electrical 10 pulses, to an enucleated oocyte from an animal of the same species from which the quiescent cell is isolated. The reconstructed oocyte is then cultured such that it develops to morula or blastocyst and then transferred to pseudopregnant female foster animal. The offspring borne of this female foster animal will be a clone of the animal from which the cell (*e.g.*, the somatic cell) is isolated.

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### **Pharmaceutical Compositions**

The ORX nucleic acid molecules, ORX proteins, and anti-ORX antibodies (also referred to herein as "active compounds") of the invention, and derivatives, fragments, analogs and homologs thereof, can be incorporated into pharmaceutical compositions suitable for 20 administration. Such compositions typically comprise the nucleic acid molecule, protein, or antibody and a pharmaceutically acceptable carrier. As used herein, "pharmaceutically acceptable carrier" is intended to include any and all solvents, dispersion media, coatings, antibacterial and antifungal agents, isotonic and absorption delaying agents, and the like, compatible with pharmaceutical administration. Suitable carriers are described in the most 25 recent edition of Remington's Pharmaceutical Sciences, a standard reference text in the field, which is incorporated herein by reference. Preferred examples of such carriers or diluents include, but are not limited to, water, saline, finger's solutions, dextrose solution, and 5% human serum albumin. Liposomes and non-aqueous vehicles such as fixed oils may also be used. The use of such media and agents for pharmaceutically active substances is well known in the art.

30 Except insofar as any conventional media or agent is incompatible with the active compound, use

thereof in the compositions is contemplated. Supplementary active compounds can also be incorporated into the compositions.

The antibodies disclosed herein can also be formulated as immunoliposomes.

Liposomes containing the antibody are prepared by methods known in the art, such as described  
5 in Epstein et al., Proc. Natl. Acad. Sci. USA, 82: 3688 (1985); Hwang et al., Proc. Natl. Acad.  
Sci. USA, 77: 4030 (1980); and U.S. Pat. Nos. 4,485,045 and 4,544,545. Liposomes with  
enhanced circulation time are disclosed in U.S. Patent No. 5,013,556.

Particularly useful liposomes can be generated by the reverse-phase evaporation method  
with a lipid composition comprising phosphatidylcholine, cholesterol, and PEG-derivatized  
10 phosphatidylethanolamine (PEG-PE). Liposomes are extruded through filters of defined pore  
size to yield liposomes with the desired diameter. Fab' fragments of the antibody of the present  
invention can be conjugated to the liposomes as described in Martin et al., J. Biol. Chem., 257:  
286-288 (1982) via a disulfide-interchange reaction. A chemotherapeutic agent (such as  
Doxorubicin) is optionally contained within the liposome. See Gabizon et al., J. National Cancer  
15 Inst., 81(19): 1484 (1989).

A pharmaceutical composition of the invention is formulated to be compatible with its  
intended route of administration. Examples of routes of administration include parenteral, e.g.,  
intravenous, intradermal, subcutaneous, oral (e.g., inhalation), transdermal (i.e., topical),  
transmucosal, and rectal administration. Solutions or suspensions used for parenteral,  
20 intradermal, or subcutaneous application can include the following components: a sterile diluent  
such as water for injection, saline solution, fixed oils, polyethylene glycols, glycerine, propylene  
glycol or other synthetic solvents; antibacterial agents such as benzyl alcohol or methyl parabens;  
antioxidants such as ascorbic acid or sodium bisulfite; chelating agents such as  
ethylenediaminetetraacetic acid (EDTA); buffers such as acetates, citrates or phosphates, and  
25 agents for the adjustment of tonicity such as sodium chloride or dextrose. The pH can be  
adjusted with acids or bases, such as hydrochloric acid or sodium hydroxide. The parenteral  
preparation can be enclosed in ampoules, disposable syringes or multiple dose vials made of  
glass or plastic.

30 Pharmaceutical compositions suitable for injectable use include sterile aqueous solutions  
(where water soluble) or dispersions and sterile powders for the extemporaneous preparation of  
sterile injectable solutions or dispersion. For intravenous administration, suitable carriers include

physiological saline, bacteriostatic water, Cremophor EL™ (BASF, Parsippany, N.J.) or phosphate buffered saline (PBS). In all cases, the composition must be sterile and should be fluid to the extent that easy syringeability exists. It must be stable under the conditions of manufacture and storage and must be preserved against the contaminating action of

5 microorganisms such as bacteria and fungi. The carrier can be a solvent or dispersion medium containing, for example, water, ethanol, polyol (for example, glycerol, propylene glycol, and liquid polyethylene glycol, and the like), and suitable mixtures thereof. The proper fluidity can be maintained, for example, by the use of a coating such as lecithin, by the maintenance of the required particle size in the case of dispersion and by the use of surfactants. Prevention of the

10 action of microorganisms can be achieved by various antibacterial and antifungal agents, for example, parabens, chlorobutanol, phenol, ascorbic acid, thimerosal, and the like. In many cases, it will be preferable to include isotonic agents, for example, sugars, polyalcohols such as manitol, sorbitol, sodium chloride in the composition. Prolonged absorption of the injectable compositions can be brought about by including in the composition an agent which delays

15 absorption, for example, aluminum monostearate and gelatin.

Sterile injectable solutions can be prepared by incorporating the active compound (*e.g.*, an ORX protein or anti-ORX antibody) in the required amount in an appropriate solvent with one or a combination of ingredients enumerated above, as required, followed by filtered sterilization. Generally, dispersions are prepared by incorporating the active compound into a sterile vehicle

20 that contains a basic dispersion medium and the required other ingredients from those enumerated above. In the case of sterile powders for the preparation of sterile injectable solutions, methods of preparation are vacuum drying and freeze-drying that yields a powder of the active ingredient plus any additional desired ingredient from a previously sterile-filtered solution thereof.

25 Oral compositions generally include an inert diluent or an edible carrier. They can be enclosed in gelatin capsules or compressed into tablets. For the purpose of oral therapeutic administration, the active compound can be incorporated with excipients and used in the form of tablets, troches, or capsules. Oral compositions can also be prepared using a fluid carrier for use as a mouthwash, wherein the compound in the fluid carrier is applied orally and swished and expectorated or swallowed. Pharmaceutically compatible binding agents, and/or adjuvant materials can be included as part of the composition. The tablets, pills, capsules, troches and the

like can contain any of the following ingredients, or compounds of a similar nature: a binder such as microcrystalline cellulose, gum tragacanth or gelatin; an excipient such as starch or lactose, a disintegrating agent such as alginic acid, Primogel, or corn starch; a lubricant such as magnesium stearate or Sterotes; a glidant such as colloidal silicon dioxide; a sweetening agent such as sucrose or saccharin; or a flavoring agent such as peppermint, methyl salicylate, or orange flavoring.

For administration by inhalation, the compounds are delivered in the form of an aerosol spray from pressured container or dispenser which contains a suitable propellant, *e.g.*, a gas such as carbon dioxide, or a nebulizer.

Systemic administration can also be by transmucosal or transdermal means. For transmucosal or transdermal administration, penetrants appropriate to the barrier to be permeated are used in the formulation. Such penetrants are generally known in the art, and include, for example, for transmucosal administration, detergents, bile salts, and fusidic acid derivatives. Transmucosal administration can be accomplished through the use of nasal sprays or suppositories. For transdermal administration, the active compounds are formulated into ointments, salves, gels, or creams as generally known in the art.

The compounds can also be prepared in the form of suppositories (*e.g.*, with conventional suppository bases such as cocoa butter and other glycerides) or retention enemas for rectal delivery.

In one embodiment, the active compounds are prepared with carriers that will protect the compound against rapid elimination from the body, such as a controlled release formulation, including implants and microencapsulated delivery systems. Biodegradable, biocompatible polymers can be used, such as ethylene vinyl acetate, polyanhydrides, polyglycolic acid, collagen, polyorthoesters, and polylactic acid. Methods for preparation of such formulations will be apparent to those skilled in the art. The materials can also be obtained commercially from Alza Corporation and Nova Pharmaceuticals, Inc. Liposomal suspensions (including liposomes targeted to infected cells with monoclonal antibodies to viral antigens) can also be used as pharmaceutically acceptable carriers. These can be prepared according to methods known to those skilled in the art, for example, as described in U.S. Patent No. 4,522,811.

It is especially advantageous to formulate oral or parenteral compositions in dosage unit form for ease of administration and uniformity of dosage. Dosage unit form as used herein refers

to physically discrete units suited as unitary dosages for the subject to be treated; each unit containing a predetermined quantity of active compound calculated to produce the desired therapeutic effect in association with the required pharmaceutical carrier. The specification for the dosage unit forms of the invention are dictated by and directly dependent on the unique  
5 characteristics of the active compound and the particular therapeutic effect to be achieved, and the limitations inherent in the art of compounding such an active compound for the treatment of individuals.

The nucleic acid molecules of the invention can be inserted into vectors and used as gene therapy vectors. Gene therapy vectors can be delivered to a subject by, for example, intravenous  
10 injection, local administration (*see, e.g.*, U.S. Patent No. 5,328,470) or by stereotactic injection (*see, e.g.*, Chen, *et al.*, 1994. *Proc. Natl. Acad. Sci. USA* 91: 3054-3057). The pharmaceutical preparation of the gene therapy vector can include the gene therapy vector in an acceptable diluent, or can comprise a slow release matrix in which the gene delivery vehicle is imbedded. Alternatively, where the complete gene delivery vector can be produced intact from recombinant  
15 cells, *e.g.*, retroviral vectors, the pharmaceutical preparation can include one or more cells that produce the gene delivery system.

Antibodies specifically binding a protein of the invention, as well as other molecules identified by the screening assays disclosed herein, can be administered for the treatment of various disorders in the form of pharmaceutical compositions. Principles and considerations involved in preparing such compositions, as well as guidance in the choice of components are provided, for example, in Remington : The Science And Practice Of Pharmacy 19th ed. (Alfonso  
20 R. Gennaro, et al., editors) Mack Pub. Co., Easton, Pa.: 1995; Drug Absorption Enhancement : Concepts, Possibilities, Limitations, And Trends, Harwood Academic Publishers, Langhorne, Pa., 1994; and Peptide And Protein Drug Delivery (Advances In Parenteral Sciences, Vol. 4),  
25 1991, M. Dekker, New York. If the antigenic protein is intracellular and whole antibodies are used as inhibitors, internalizing antibodies are preferred. However, liposomes can also be used to deliver the antibody, or an antibody fragment, into cells. Where antibody fragments are used, the smallest inhibitory fragment that specifically binds to the binding domain of the target protein is preferred. For example, based upon the variable-region sequences of an antibody, peptide molecules can be designed that retain the ability to bind the target protein sequence. Such  
30 peptides can be synthesized chemically and/or produced by recombinant DNA technology. See,

*e.g.*, Marasco *et al.*, 1993 *Proc. Natl. Acad. Sci. USA*, 90: 7889-7893. The formulation herein can also contain more than one active compound as necessary for the particular indication being treated, preferably those with complementary activities that do not adversely affect each other. Alternatively, or in addition, the composition can comprise an agent that enhances its function, 5 such as, for example, a cytotoxic agent, cytokine, chemotherapeutic agent, or growth-inhibitory agent. Such molecules are suitably present in combination in amounts that are effective for the purpose intended. The active ingredients can also be entrapped in microcapsules prepared, for example, by coacervation techniques or by interfacial polymerization, for example, hydroxymethylcellulose or gelatin-microcapsules and poly-(methylmethacrylate) microcapsules, 10 respectively, in colloidal drug delivery systems (for example, liposomes, albumin microspheres, microemulsions, nano-particles, and nanocapsules) or in macroemulsions.

The formulations to be used for *in vivo* administration must be sterile. This is readily accomplished by filtration through sterile filtration membranes.

Sustained-release preparations can be prepared. Suitable examples of sustained-release 15 preparations include semipermeable matrices of solid hydrophobic polymers containing the antibody, which matrices are in the form of shaped articles, *e.g.*, films, or microcapsules. Examples of sustained-release matrices include polyesters, hydrogels (for example, poly(2-hydroxyethyl-methacrylate), or poly(vinylalcohol)), polylactides (U.S. Pat. No. 3,773,919), copolymers of L-glutamic acid and ? ethyl-L-glutamate, non-degradable ethylene-vinyl acetate, 20 degradable lactic acid-glycolic acid copolymers such as the LUPRON DEPOT <sup>TM</sup> (injectable microspheres composed of lactic acid-glycolic acid copolymer and leuprolide acetate), and poly-D-(-)-3-hydroxybutyric acid. While polymers such as ethylene-vinyl acetate and lactic acid-glycolic acid enable release of molecules for over 100 days, certain hydrogels release proteins for shorter time periods.

25 The pharmaceutical compositions can be included in a container, pack, or dispenser together with instructions for administration.

### **Screening and Detection Methods**

The isolated nucleic acid molecules of the invention can be used to express ORX protein 30 (*e.g.*, via a recombinant expression vector in a host cell in gene therapy applications), to detect ORX mRNA (*e.g.*, in a biological sample) or a genetic lesion in an ORX gene, and to modulate

ORX activity, as described further, below. In addition, the ORX proteins can be used to screen drugs or compounds that modulate the ORX protein activity or expression as well as to treat disorders characterized by insufficient or excessive production of ORX protein or production of ORX protein forms that have decreased or aberrant activity compared to ORX wild-type protein .

- 5 In addition, the anti-ORX antibodies of the invention can be used to detect and isolate ORX proteins and modulate ORX activity. For example, ORX activity includes growth and differentiation, antibody production, and tumor growth.

The invention further pertains to novel agents identified by the screening assays described herein and uses thereof for treatments as described, *supra*.

10 *Screening Assays*

The invention provides a method (also referred to herein as a "screening assay") for identifying modulators, *i.e.*, candidate or test compounds or agents (*e.g.*, peptides, peptidomimetics, small molecules or other drugs) that bind to ORX proteins or have a stimulatory or inhibitory effect on, *e.g.*, ORX protein expression or ORX protein activity. The 15 invention also includes compounds identified in the screening assays described herein.

In one embodiment, the invention provides assays for screening candidate or test compounds which bind to or modulate the activity of the membrane-bound form of an ORX protein or polypeptide or biologically-active portion thereof. The test compounds of the invention can be obtained using any of the numerous approaches in combinatorial library methods known in the art, including: biological libraries; spatially addressable parallel solid phase or solution phase libraries; synthetic library methods requiring deconvolution; the "one-bead one-compound" library method; and synthetic library methods using affinity chromatography selection. The biological library approach is limited to peptide libraries, while the other four approaches are applicable to peptide, non-peptide oligomer or small molecule 20 libraries of compounds. *See, e.g., Lam, 1997. Anticancer Drug Design 12: 145.*

A "small molecule" as used herein, is meant to refer to a composition that has a molecular weight of less than about 5 kD and most preferably less than about 4 kD. Small molecules can be, *e.g.*, nucleic acids, peptides, polypeptides, peptidomimetics, carbohydrates, lipids or other organic or inorganic molecules. Libraries of chemical and/or biological mixtures, such as fungal, 25 bacterial, or algal extracts, are known in the art and can be screened with any of the assays of the invention.

Examples of methods for the synthesis of molecular libraries can be found in the art, for example in: DeWitt, *et al.*, 1993. *Proc. Natl. Acad. Sci. U.S.A.* 90: 6909; Erb, *et al.*, 1994. *Proc. Natl. Acad. Sci. U.S.A.* 91: 11422; Zuckermann, *et al.*, 1994. *J. Med. Chem.* 37: 2678; Cho, *et al.*, 1993. *Science* 261: 1303; Carell, *et al.*, 1994. *Angew. Chem. Int. Ed. Engl.* 33: 2059; Carell, *et al.*, 1994. *Angew. Chem. Int. Ed. Engl.* 33: 2061; and Gallop, *et al.*, 1994. *J. Med. Chem.* 37: 1233.

Libraries of compounds may be presented in solution (e.g., Houghten, 1992. *Biotechniques* 13: 412-421), or on beads (Lam, 1991. *Nature* 354: 82-84), on chips (Fodor, 1993. *Nature* 364: 555-556), bacteria (Ladner, U.S. Patent No. 5,223,409), spores (Ladner, U.S. Patent 10 5,233,409), plasmids (Cull, *et al.*, 1992. *Proc. Natl. Acad. Sci. USA* 89: 1865-1869) or on phage (Scott and Smith, 1990. *Science* 249: 386-390; Devlin, 1990. *Science* 249: 404-406; Cwirla, *et al.*, 1990. *Proc. Natl. Acad. Sci. U.S.A.* 87: 6378-6382; Felici, 1991. *J. Mol. Biol.* 222: 301-310; Ladner, U.S. Patent No. 5,233,409.).

In one embodiment, an assay is a cell-based assay in which a cell which expresses a 15 membrane-bound form of ORX protein, or a biologically-active portion thereof, on the cell surface is contacted with a test compound and the ability of the test compound to bind to an ORX protein determined. The cell, for example, can be of mammalian origin or a yeast cell.

Determining the ability of the test compound to bind to the ORX protein can be accomplished, for example, by coupling the test compound with a radioisotope or enzymatic label such that 20 binding of the test compound to the ORX protein or biologically-active portion thereof can be determined by detecting the labeled compound in a complex. For example, test compounds can be labeled with  $^{125}\text{I}$ ,  $^{35}\text{S}$ ,  $^{14}\text{C}$ , or  $^3\text{H}$ , either directly or indirectly, and the radioisotope detected by direct counting of radioemission or by scintillation counting. Alternatively, test compounds can be enzymatically-labeled with, for example, horseradish peroxidase, alkaline phosphatase, or 25 luciferase, and the enzymatic label detected by determination of conversion of an appropriate substrate to product. In one embodiment, the assay comprises contacting a cell which expresses a membrane-bound form of ORX protein, or a biologically-active portion thereof, on the cell surface with a known compound which binds ORX to form an assay mixture, contacting the assay mixture with a test compound, and determining the ability of the test compound to interact 30 with an ORX protein, wherein determining the ability of the test compound to interact with an

ORX protein comprises determining the ability of the test compound to preferentially bind to ORX protein or a biologically-active portion thereof as compared to the known compound.

In another embodiment, an assay is a cell-based assay comprising contacting a cell expressing a membrane-bound form of ORX protein, or a biologically-active portion thereof, on the cell surface with a test compound and determining the ability of the test compound to modulate (*e.g.*, stimulate or inhibit) the activity of the ORX protein or biologically-active portion thereof. Determining the ability of the test compound to modulate the activity of ORX or a biologically-active portion thereof can be accomplished, for example, by determining the ability of the ORX protein to bind to or interact with an ORX target molecule. As used herein, a "target molecule" is a molecule with which an ORX protein binds or interacts in nature, for example, a molecule on the surface of a cell which expresses an ORX interacting protein, a molecule on the surface of a second cell, a molecule in the extracellular milieu, a molecule associated with the internal surface of a cell membrane or a cytoplasmic molecule. An ORX target molecule can be a non-ORX molecule or an ORX protein or polypeptide of the invention. In one embodiment, an ORX target molecule is a component of a signal transduction pathway that facilitates transduction of an extracellular signal (*e.g.* a signal generated by binding of a compound to a membrane-bound ORX molecule) through the cell membrane and into the cell. The target, for example, can be a second intercellular protein that has catalytic activity or a protein that facilitates the association of downstream signaling molecules with ORX.

Determining the ability of the ORX protein to bind to or interact with an ORX target molecule can be accomplished by one of the methods described above for determining direct binding. In one embodiment, determining the ability of the ORX protein to bind to or interact with an ORX target molecule can be accomplished by determining the activity of the target molecule. For example, the activity of the target molecule can be determined by detecting induction of a cellular second messenger of the target (*i.e.* intracellular  $\text{Ca}^{2+}$ , diacylglycerol,  $\text{IP}_3$ , etc.), detecting catalytic/enzymatic activity of the target an appropriate substrate, detecting the induction of a reporter gene (comprising an ORX-responsive regulatory element operatively linked to a nucleic acid encoding a detectable marker, *e.g.*, luciferase), or detecting a cellular response, for example, cell survival, cellular differentiation, or cell proliferation.

In yet another embodiment, an assay of the invention is a cell-free assay comprising contacting an ORX protein or biologically-active portion thereof with a test compound and

determining the ability of the test compound to bind to the ORX protein or biologically-active portion thereof. Binding of the test compound to the ORX protein can be determined either directly or indirectly as described above. In one such embodiment, the assay comprises contacting the ORX protein or biologically-active portion thereof with a known compound which binds ORX to form an assay mixture, contacting the assay mixture with a test compound, and determining the ability of the test compound to interact with an ORX protein, wherein determining the ability of the test compound to interact with an ORX protein comprises determining the ability of the test compound to preferentially bind to ORX or biologically-active portion thereof as compared to the known compound.

In still another embodiment, an assay is a cell-free assay comprising contacting ORX protein or biologically-active portion thereof with a test compound and determining the ability of the test compound to modulate (*e.g.* stimulate or inhibit) the activity of the ORX protein or biologically-active portion thereof. Determining the ability of the test compound to modulate the activity of ORX can be accomplished, for example, by determining the ability of the ORX protein to bind to an ORX target molecule by one of the methods described above for determining direct binding. In an alternative embodiment, determining the ability of the test compound to modulate the activity of ORX protein can be accomplished by determining the ability of the ORX protein further modulate an ORX target molecule. For example, the catalytic/enzymatic activity of the target molecule on an appropriate substrate can be determined as described above.

In yet another embodiment, the cell-free assay comprises contacting the ORX protein or biologically-active portion thereof with a known compound which binds ORX protein to form an assay mixture, contacting the assay mixture with a test compound, and determining the ability of the test compound to interact with an ORX protein, wherein determining the ability of the test compound to interact with an ORX protein comprises determining the ability of the ORX protein to preferentially bind to or modulate the activity of an ORX target molecule.

The cell-free assays of the invention are amenable to use of both the soluble form or the membrane-bound form of ORX protein. In the case of cell-free assays comprising the membrane-bound form of ORX protein, it may be desirable to utilize a solubilizing agent such that the membrane-bound form of ORX protein is maintained in solution. Examples of such solubilizing agents include non-ionic detergents such as n-octylglucoside, n-dodecylglucoside,

n-dodecylmaltoside, octanoyl-N-methylglucamide, decanoyl-N-methylglucamide, Triton® X-100, Triton® X-114, Thesit®, Isotridecypoly(ethylene glycol ether)<sub>n</sub>, N-dodecyl--N,N-dimethyl-3-ammonio-1-propane sulfonate, 3-(3-cholamidopropyl) dimethylamminiol-1-propane sulfonate (CHAPS), or 3-(3-cholamidopropyl)dimethylamminiol-2-hydroxy-1-propane sulfonate (CHAPSO).

In more than one embodiment of the above assay methods of the invention, it may be desirable to immobilize either ORX protein or its target molecule to facilitate separation of complexed from uncomplexed forms of one or both of the proteins, as well as to accommodate automation of the assay. Binding of a test compound to ORX protein, or interaction of ORX protein with a target molecule in the presence and absence of a candidate compound, can be accomplished in any vessel suitable for containing the reactants. Examples of such vessels include microtiter plates, test tubes, and micro-centrifuge tubes. In one embodiment, a fusion protein can be provided that adds a domain that allows one or both of the proteins to be bound to a matrix. For example, GST-ORX fusion proteins or GST-target fusion proteins can be adsorbed onto glutathione sepharose beads (Sigma Chemical, St. Louis, MO) or glutathione derivatized microtiter plates, that are then combined with the test compound or the test compound and either the non-adsorbed target protein or ORX protein, and the mixture is incubated under conditions conducive to complex formation (*e.g.*, at physiological conditions for salt and pH). Following incubation, the beads or microtiter plate wells are washed to remove any unbound components, the matrix immobilized in the case of beads, complex determined either directly or indirectly, for example, as described, *supra*. Alternatively, the complexes can be dissociated from the matrix, and the level of ORX protein binding or activity determined using standard techniques.

Other techniques for immobilizing proteins on matrices can also be used in the screening assays of the invention. For example, either the ORX protein or its target molecule can be immobilized utilizing conjugation of biotin and streptavidin. Biotinylated ORX protein or target molecules can be prepared from biotin-NHS (N-hydroxy-succinimide) using techniques well-known within the art (*e.g.*, biotinylation kit, Pierce Chemicals, Rockford, Ill.), and immobilized in the wells of streptavidin-coated 96 well plates (Pierce Chemical). Alternatively, antibodies reactive with ORX protein or target molecules, but which do not interfere with binding of the ORX protein to its target molecule, can be derivatized to the wells of the plate, and unbound target or ORX protein trapped in the wells by antibody conjugation. Methods for detecting such

complexes, in addition to those described above for the GST-immobilized complexes, include immunodetection of complexes using antibodies reactive with the ORX protein or target molecule, as well as enzyme-linked assays that rely on detecting an enzymatic activity associated with the ORX protein or target molecule.

5        In another embodiment, modulators of ORX protein expression are identified in a method wherein a cell is contacted with a candidate compound and the expression of ORX mRNA or protein in the cell is determined. The level of expression of ORX mRNA or protein in the presence of the candidate compound is compared to the level of expression of ORX mRNA or protein in the absence of the candidate compound. The candidate compound can then be  
10      identified as a modulator of ORX mRNA or protein expression based upon this comparison. For example, when expression of ORX mRNA or protein is greater (*i.e.*, statistically significantly greater) in the presence of the candidate compound than in its absence, the candidate compound is identified as a stimulator of ORX mRNA or protein expression. Alternatively, when expression of ORX mRNA or protein is less (statistically significantly less) in the presence of the  
15      candidate compound than in its absence, the candidate compound is identified as an inhibitor of ORX mRNA or protein expression. The level of ORX mRNA or protein expression in the cells can be determined by methods described herein for detecting ORX mRNA or protein.

      In yet another aspect of the invention, the ORX proteins can be used as "bait proteins" in a two-hybrid assay or three hybrid assay (*see, e.g.*, U.S. Patent No. 5,283,317; Zervos, *et al.*,  
20      1993. *Cell* 72: 223-232; Madura, *et al.*, 1993. *J. Biol. Chem.* 268: 12046-12054; Bartel, *et al.*,  
1993. *Biotechniques* 14: 920-924; Iwabuchi, *et al.*, 1993. *Oncogene* 8: 1693-1696; and Brent WO  
94/10300), to identify other proteins that bind to or interact with ORX ("ORX-binding proteins"  
or "ORX-bp") and modulate ORX activity. Such ORX-binding proteins are also likely to be  
involved in the propagation of signals by the ORX proteins as, for example, upstream or  
25      downstream elements of the ORX pathway.

      The two-hybrid system is based on the modular nature of most transcription factors, which consist of separable DNA-binding and activation domains. Briefly, the assay utilizes two different DNA constructs. In one construct, the gene that codes for ORX is fused to a gene encoding the DNA binding domain of a known transcription factor (*e.g.*, GAL-4). In the other  
30      construct, a DNA sequence, from a library of DNA sequences, that encodes an unidentified protein ("prey" or "sample") is fused to a gene that codes for the activation domain of the known

transcription factor. If the "bait" and the "prey" proteins are able to interact, *in vivo*, forming an ORX-dependent complex, the DNA-binding and activation domains of the transcription factor are brought into close proximity. This proximity allows transcription of a reporter gene (*e.g.*, LacZ) that is operably linked to a transcriptional regulatory site responsive to the transcription factor. Expression of the reporter gene can be detected and cell colonies containing the functional transcription factor can be isolated and used to obtain the cloned gene that encodes the protein which interacts with ORX.

The invention further pertains to novel agents identified by the aforementioned screening assays and uses thereof for treatments as described herein.

10

### **Detection Assays**

Portions or fragments of the cDNA sequences identified herein (and the corresponding complete gene sequences) can be used in numerous ways as polynucleotide reagents. By way of example, and not of limitation, these sequences can be used to: (i) identify an individual from a minute biological sample (tissue typing); and (ii) aid in forensic identification of a biological sample. Some of these applications are described in the subsections, below.

#### *Tissue Typing*

The ORX sequences of the invention can be used to identify individuals from minute biological samples. In this technique, an individual's genomic DNA is digested with one or more restriction enzymes, and probed on a Southern blot to yield unique bands for identification. The sequences of the invention are useful as additional DNA markers for RFLP ("restriction fragment length polymorphisms," described in U.S. Patent No. 5,272,057).

Furthermore, the sequences of the invention can be used to provide an alternative technique that determines the actual base-by-base DNA sequence of selected portions of an individual's genome. Thus, the ORX sequences described herein can be used to prepare two PCR primers from the 5'- and 3'-termini of the sequences. These primers can then be used to amplify an individual's DNA and subsequently sequence it.

Panels of corresponding DNA sequences from individuals, prepared in this manner, can provide unique individual identifications, as each individual will have a unique set of such DNA sequences due to allelic differences. The sequences of the invention can be used to obtain such identification sequences from individuals and from tissue. The ORX sequences of the invention

uniquely represent portions of the human genome. Allelic variation occurs to some degree in the coding regions of these sequences, and to a greater degree in the noncoding regions. It is estimated that allelic variation between individual humans occurs with a frequency of about once per each 500 bases. Much of the allelic variation is due to single nucleotide polymorphisms (SNPs), which include restriction fragment length polymorphisms (RFLPs).

Each of the sequences described herein can, to some degree, be used as a standard against which DNA from an individual can be compared for identification purposes. Because greater numbers of polymorphisms occur in the noncoding regions, fewer sequences are necessary to differentiate individuals. The noncoding sequences can comfortably provide positive individual identification with a panel of perhaps 10 to 1,000 primers that each yield a noncoding amplified sequence of 100 bases. If predicted coding sequences are used, a more appropriate number of primers for positive individual identification would be 500-2,000.

### Predictive Medicine

The invention also pertains to the field of predictive medicine in which diagnostic assays, prognostic assays, pharmacogenomics, and monitoring clinical trials are used for prognostic (predictive) purposes to thereby treat an individual prophylactically. Accordingly, one aspect of the invention relates to diagnostic assays for determining ORX protein and/or nucleic acid expression as well as ORX activity, in the context of a biological sample (*e.g.*, blood, serum, cells, tissue) to thereby determine whether an individual is afflicted with a disease or disorder, or is at risk of developing a disorder, associated with aberrant ORX expression or activity. Disorders associated with aberrant ORX expression or activity include, for example, neurodegenerative, cell proliferative, angiogenic, hematopoietic, immunological, inflammatory, and tumor-related disorders and/or pathologies.

The invention also provides for prognostic (or predictive) assays for determining whether an individual is at risk of developing a disorder associated with ORX protein, nucleic acid expression or activity. For example, mutations in an ORX gene can be assayed in a biological sample. Such assays can be used for prognostic or predictive purpose to thereby prophylactically treat an individual prior to the onset of a disorder characterized by or associated with ORX protein, nucleic acid expression, or biological activity.

Another aspect of the invention provides methods for determining ORX protein, nucleic acid expression or activity in an individual to thereby select appropriate therapeutic or prophylactic agents for that individual (referred to herein as "pharmacogenomics").

Pharmacogenomics allows for the selection of agents (e.g., drugs) for therapeutic or prophylactic treatment of an individual based on the genotype of the individual (e.g., the genotype of the individual examined to determine the ability of the individual to respond to a particular agent.)

Yet another aspect of the invention pertains to monitoring the influence of agents (e.g., drugs, compounds) on the expression or activity of ORX in clinical trials.

These and other agents are described in further detail in the following sections.

10      *Diagnostic Assays*

An exemplary method for detecting the presence or absence of ORX in a biological sample involves obtaining a biological sample from a test subject and contacting the biological sample with a compound or an agent capable of detecting ORX protein or nucleic acid (e.g., mRNA, genomic DNA) that encodes ORX protein such that the presence of ORX is detected in the biological sample. An agent for detecting ORX mRNA or genomic DNA is a labeled nucleic acid probe capable of hybridizing to ORX mRNA or genomic DNA. The nucleic acid probe can be, for example, a full-length ORX nucleic acid, or a portion thereof, such as an oligonucleotide of at least 15, 30, 50, 100, 250 or 500 nucleotides in length and sufficient to specifically hybridize under stringent conditions to ORX mRNA or genomic DNA. Other suitable probes for use in the diagnostic assays of the invention are described herein.

One agent for detecting ORX protein is an antibody capable of binding to ORX protein, preferably an antibody with a detectable label. Antibodies directed against a protein of the invention may be used in methods known within the art relating to the localization and/or quantitation of the protein (e.g., for use in measuring levels of the protein within appropriate physiological samples, for use in diagnostic methods, for use in imaging the protein, and the like). In a given embodiment, antibodies against the proteins, or derivatives, fragments, analogs or homologs thereof, that contain the antigen binding domain, are utilized as pharmacologically-active compounds.

An antibody specific for a protein of the invention can be used to isolate the protein by standard techniques, such as immunoaffinity chromatography or immunoprecipitation. Such an antibody can facilitate the purification of the natural protein antigen from cells and of

recombinantly produced antigen expressed in host cells. Moreover, such an antibody can be used to detect the antigenic protein (*e.g.*, in a cellular lysate or cell supernatant) in order to evaluate the abundance and pattern of expression of the antigenic protein. Antibodies directed against the protein can be used diagnostically to monitor protein levels in tissue as part of a clinical testing procedure, *e.g.*, to, for example, determine the efficacy of a given treatment regimen. Detection can be facilitated by coupling (*i.e.*, physically linking) the antibody to a detectable substance. Examples of detectable substances include various enzymes, prosthetic groups, fluorescent materials, luminescent materials, bioluminescent materials, and radioactive materials. Examples of suitable enzymes include horseradish peroxidase, alkaline phosphatase,  $\beta$ -galactosidase, or acetylcholinesterase; examples of suitable prosthetic group complexes include streptavidin/biotin and avidin/biotin; examples of suitable fluorescent materials include umbelliferone, fluorescein, fluorescein isothiocyanate, rhodamine, dichlorotriazinylamine fluorescein, dansyl chloride or phycoerythrin; an example of a luminescent material includes luminol; examples of bioluminescent materials include luciferase, luciferin, and aequorin, and examples of suitable radioactive material include  $^{125}\text{I}$ ,  $^{131}\text{I}$ ,  $^{35}\text{S}$  or  $^3\text{H}$ .

Antibodies can be polyclonal, or more preferably, monoclonal. An intact antibody, or a fragment thereof (*e.g.*, Fab or  $\text{F}(\text{ab}')_2$ ) can be used. The term "labeled", with regard to the probe or antibody, is intended to encompass direct labeling of the probe or antibody by coupling (*i.e.*, physically linking) a detectable substance to the probe or antibody, as well as indirect labeling of the probe or antibody by reactivity with another reagent that is directly labeled. Examples of indirect labeling include detection of a primary antibody using a fluorescently-labeled secondary antibody and end-labeling of a DNA probe with biotin such that it can be detected with fluorescently-labeled streptavidin. The term "biological sample" is intended to include tissues, cells and biological fluids isolated from a subject, as well as tissues, cells and fluids present within a subject. That is, the detection method of the invention can be used to detect ORX mRNA, protein, or genomic DNA in a biological sample *in vitro* as well as *in vivo*. For example, *in vitro* techniques for detection of ORX mRNA include Northern hybridizations and *in situ* hybridizations. *In vitro* techniques for detection of ORX protein include enzyme linked immunosorbent assays (ELISAs), Western blots, immunoprecipitations, and immunofluorescence. *In vitro* techniques for detection of ORX genomic DNA include Southern hybridizations. Furthermore, *in vivo* techniques for detection of ORX protein include

introducing into a subject a labeled anti-ORX antibody. For example, the antibody can be labeled with a radioactive marker whose presence and location in a subject can be detected by standard imaging techniques.

In one embodiment, the biological sample contains protein molecules from the test subject. Alternatively, the biological sample can contain mRNA molecules from the test subject or genomic DNA molecules from the test subject. A preferred biological sample is a peripheral blood leukocyte sample isolated by conventional means from a subject.

In one embodiment, the methods further involve obtaining a control biological sample from a control subject, contacting the control sample with a compound or agent capable of detecting ORX protein, mRNA, or genomic DNA, such that the presence of ORX protein, mRNA or genomic DNA is detected in the biological sample, and comparing the presence of ORX protein, mRNA or genomic DNA in the control sample with the presence of ORX protein, mRNA or genomic DNA in the test sample.

The invention also encompasses kits for detecting the presence of ORX in a biological sample. For example, the kit can comprise: a labeled compound or agent capable of detecting ORX protein or mRNA in a biological sample; means for determining the amount of ORX in the sample; and means for comparing the amount of ORX in the sample with a standard. The compound or agent can be packaged in a suitable container. The kit can further comprise instructions for using the kit to detect ORX protein or nucleic acid.

#### 20      *Prognostic Assays*

The diagnostic methods described herein can furthermore be utilized to identify subjects having or at risk of developing a disease or disorder associated with aberrant ORX expression or activity. For example, the assays described herein, such as the preceding diagnostic assays or the following assays, can be utilized to identify a subject having or at risk of developing a disorder associated with ORX protein, nucleic acid expression or activity. Such disorders include for example, neurodegenerative, cell proliferative, angiogenic, hematopoietic, immunological, inflammatory, and tumor-related disorders and/or pathologies.

Alternatively, the prognostic assays can be utilized to identify a subject having or at risk for developing a disease or disorder. Thus, the invention provides a method for identifying a disease or disorder associated with aberrant ORX expression or activity in which a test sample is obtained from a subject and ORX protein or nucleic acid (e.g., mRNA, genomic DNA) is

detected, wherein the presence of ORX protein or nucleic acid is diagnostic for a subject having or at risk of developing a disease or disorder associated with aberrant ORX expression or activity. As used herein, a "test sample" refers to a biological sample obtained from a subject of interest. For example, a test sample can be a biological fluid (*e.g.*, serum), cell sample, or tissue.

5 Furthermore, the prognostic assays described herein can be used to determine whether a subject can be administered an agent (*e.g.*, an agonist, antagonist, peptidomimetic, protein, peptide, nucleic acid, small molecule, or other drug candidate) to treat a disease or disorder associated with aberrant ORX expression or activity. For example, such methods can be used to determine whether a subject can be effectively treated with an agent for a disorder. Thus, the  
10 invention provides methods for determining whether a subject can be effectively treated with an agent for a disorder associated with aberrant ORX expression or activity in which a test sample is obtained and ORX protein or nucleic acid is detected (*e.g.*, wherein the presence of ORX protein or nucleic acid is diagnostic for a subject that can be administered the agent to treat a disorder associated with aberrant ORX expression or activity).

15 The methods of the invention can also be used to detect genetic lesions in an ORX gene, thereby determining if a subject with the lesioned gene is at risk for a disorder characterized by aberrant cell proliferation and/or differentiation. In various embodiments, the methods include detecting, in a sample of cells from the subject, the presence or absence of a genetic lesion characterized by at least one of an alteration affecting the integrity of a gene encoding an  
20 ORX-protein, or the misexpression of the ORX gene. For example, such genetic lesions can be detected by ascertaining the existence of at least one of: (i) a deletion of one or more nucleotides from an ORX gene; (ii) an addition of one or more nucleotides to an ORX gene; (iii) a substitution of one or more nucleotides of an ORX gene, (iv) a chromosomal rearrangement of an ORX gene; (v) an alteration in the level of a messenger RNA transcript of an ORX gene, (vi)  
25 aberrant modification of an ORX gene, such as of the methylation pattern of the genomic DNA, (vii) the presence of a non-wild-type splicing pattern of a messenger RNA transcript of an ORX gene, (viii) a non-wild-type level of an ORX protein, (ix) allelic loss of an ORX gene, and (x) inappropriate post-translational modification of an ORX protein. As described herein, there are a large number of assay techniques known in the art which can be used for detecting lesions in an  
30 ORX gene. A preferred biological sample is a peripheral blood leukocyte sample isolated by

conventional means from a subject. However, any biological sample containing nucleated cells may be used, including, for example, buccal mucosal cells.

In certain embodiments, detection of the lesion involves the use of a probe/primer in a polymerase chain reaction (PCR) (*see, e.g.*, U.S. Patent Nos. 4,683,195 and 4,683,202), such as  
5 anchor PCR or RACE PCR, or, alternatively, in a ligation chain reaction (LCR) (*see, e.g.*,  
Landegran, *et al.*, 1988. *Science* 241: 1077-1080; and Nakazawa, *et al.*, 1994. *Proc. Natl. Acad.  
Sci. USA* 91: 360-364), the latter of which can be particularly useful for detecting point mutations  
in the ORX-gene (*see*, Abravaya, *et al.*, 1995. *Nucl. Acids Res.* 23: 675-682). This method can  
include the steps of collecting a sample of cells from a patient, isolating nucleic acid (*e.g.*,  
10 genomic, mRNA or both) from the cells of the sample, contacting the nucleic acid sample with  
one or more primers that specifically hybridize to an ORX gene under conditions such that  
hybridization and amplification of the ORX gene (if present) occurs, and detecting the presence  
or absence of an amplification product, or detecting the size of the amplification product and  
comparing the length to a control sample. It is anticipated that PCR and/or LCR may be  
15 desirable to use as a preliminary amplification step in conjunction with any of the techniques  
used for detecting mutations described herein.

Alternative amplification methods include: self sustained sequence replication (*see*,  
Guatelli, *et al.*, 1990. *Proc. Natl. Acad. Sci. USA* 87: 1874-1878), transcriptional amplification  
system (*see*, Kwoh, *et al.*, 1989. *Proc. Natl. Acad. Sci. USA* 86: 1173-1177); Q $\beta$  Replicase (*see*,  
20 Lizardi, *et al.*, 1988. *BioTechnology* 6: 1197), or any other nucleic acid amplification method,  
followed by the detection of the amplified molecules using techniques well known to those of  
skill in the art. These detection schemes are especially useful for the detection of nucleic acid  
molecules if such molecules are present in very low numbers.

In an alternative embodiment, mutations in an ORX gene from a sample cell can be  
25 identified by alterations in restriction enzyme cleavage patterns. For example, sample and  
control DNA is isolated, amplified (optionally), digested with one or more restriction  
endonucleases, and fragment length sizes are determined by gel electrophoresis and compared.  
Differences in fragment length sizes between sample and control DNA indicates mutations in the  
sample DNA. Moreover, the use of sequence specific ribozymes (*see, e.g.*, U.S. Patent No.  
30 5,493,531) can be used to score for the presence of specific mutations by development or loss of  
a ribozyme cleavage site.

In other embodiments, genetic mutations in ORX can be identified by hybridizing a sample and control nucleic acids, e.g., DNA or RNA, to high-density arrays containing hundreds or thousands of oligonucleotides probes. See, e.g., Cronin, et al., 1996. *Human Mutation* 7: 244-255; Kozal, et al., 1996. *Nat. Med.* 2: 753-759. For example, genetic mutations in ORX can 5 be identified in two dimensional arrays containing light-generated DNA probes as described in Cronin, et al., *supra*. Briefly, a first hybridization array of probes can be used to scan through long stretches of DNA in a sample and control to identify base changes between the sequences by making linear arrays of sequential overlapping probes. This step allows the identification of point mutations. This is followed by a second hybridization array that allows the characterization 10 of specific mutations by using smaller, specialized probe arrays complementary to all variants or mutations detected. Each mutation array is composed of parallel probe sets, one complementary to the wild-type gene and the other complementary to the mutant gene.

In yet another embodiment, any of a variety of sequencing reactions known in the art can be used to directly sequence the ORX gene and detect mutations by comparing the sequence of 15 the sample ORX with the corresponding wild-type (control) sequence. Examples of sequencing reactions include those based on techniques developed by Maxim and Gilbert, 1977. *Proc. Natl. Acad. Sci. USA* 74: 560 or Sanger, 1977. *Proc. Natl. Acad. Sci. USA* 74: 5463. It is also contemplated that any of a variety of automated sequencing procedures can be utilized when 20 performing the diagnostic assays (see, e.g., Naeve, et al., 1995. *Biotechniques* 19: 448), including sequencing by mass spectrometry (see, e.g., PCT International Publication No. WO 94/16101; Cohen, et al., 1996. *Adv. Chromatography* 36: 127-162; and Griffin, et al., 1993. *Appl. Biochem. Biotechnol.* 38: 147-159).

Other methods for detecting mutations in the ORX gene include methods in which 25 protection from cleavage agents is used to detect mismatched bases in RNA/RNA or RNA/DNA heteroduplexes. See, e.g., Myers, et al., 1985. *Science* 230: 1242. In general, the art technique of "mismatch cleavage" starts by providing heteroduplexes formed by hybridizing (labeled) RNA or DNA containing the wild-type ORX sequence with potentially mutant RNA or DNA obtained from a tissue sample. The double-stranded duplexes are treated with an agent that cleaves single-stranded regions of the duplex such as which will exist due to basepair mismatches 30 between the control and sample strands. For instance, RNA/DNA duplexes can be treated with RNase and DNA/DNA hybrids treated with S<sub>1</sub> nuclease to enzymatically digesting the

mismatched regions. In other embodiments, either DNA/DNA or RNA/DNA duplexes can be treated with hydroxylamine or osmium tetroxide and with piperidine in order to digest mismatched regions. After digestion of the mismatched regions, the resulting material is then separated by size on denaturing polyacrylamide gels to determine the site of mutation. *See, e.g.,*  
5 *Cotton, et al., 1988. Proc. Natl. Acad. Sci. USA 85: 4397; Saleeba, et al., 1992. Methods Enzymol. 217: 286-295.* In an embodiment, the control DNA or RNA can be labeled for detection.

In still another embodiment, the mismatch cleavage reaction employs one or more proteins that recognize mismatched base pairs in double-stranded DNA (so called "DNA mismatch repair" enzymes) in defined systems for detecting and mapping point mutations in  
10 ORX cDNAs obtained from samples of cells. For example, the mutY enzyme of *E. coli* cleaves A at G/A mismatches and the thymidine DNA glycosylase from HeLa cells cleaves T at G/T mismatches. *See, e.g., Hsu, et al., 1994. Carcinogenesis 15: 1657-1662.* According to an exemplary embodiment, a probe based on an ORX sequence, *e.g.*, a wild-type ORX sequence, is  
15 hybridized to a cDNA or other DNA product from a test cell(s). The duplex is treated with a DNA mismatch repair enzyme, and the cleavage products, if any, can be detected from electrophoresis protocols or the like. *See, e.g., U.S. Patent No. 5,459,039.*

In other embodiments, alterations in electrophoretic mobility will be used to identify mutations in ORX genes. For example, single strand conformation polymorphism (SSCP) may  
20 be used to detect differences in electrophoretic mobility between mutant and wild type nucleic acids. *See, e.g., Orita, et al., 1989. Proc. Natl. Acad. Sci. USA: 86: 2766; Cotton, 1993. Mutat. Res. 285: 125-144; Hayashi, 1992. Genet. Anal. Tech. Appl. 9: 73-79.* Single-stranded DNA fragments of sample and control ORX nucleic acids will be denatured and allowed to renature. The secondary structure of single-stranded nucleic acids varies according to sequence, the  
25 resulting alteration in electrophoretic mobility enables the detection of even a single base change. The DNA fragments may be labeled or detected with labeled probes. The sensitivity of the assay may be enhanced by using RNA (rather than DNA), in which the secondary structure is more sensitive to a change in sequence. In one embodiment, the subject method utilizes heteroduplex analysis to separate double stranded heteroduplex molecules on the basis of changes in  
30 electrophoretic mobility. *See, e.g., Keen, et al., 1991. Trends Genet. 7: 5.*

In yet another embodiment, the movement of mutant or wild-type fragments in polyacrylamide gels containing a gradient of denaturant is assayed using denaturing gradient gel electrophoresis (DGGE). See, e.g., Myers, et al., 1985. *Nature* 313: 495. When DGGE is used as the method of analysis, DNA will be modified to insure that it does not completely denature, 5 for example by adding a GC clamp of approximately 40 bp of high-melting GC-rich DNA by PCR. In a further embodiment, a temperature gradient is used in place of a denaturing gradient to identify differences in the mobility of control and sample DNA. See, e.g., Rosenbaum and Reissner, 1987. *Biophys. Chem.* 265: 12753.

Examples of other techniques for detecting point mutations include, but are not limited to, 10 selective oligonucleotide hybridization, selective amplification, or selective primer extension. For example, oligonucleotide primers may be prepared in which the known mutation is placed centrally and then hybridized to target DNA under conditions that permit hybridization only if a perfect match is found. See, e.g., Saiki, et al., 1986. *Nature* 324: 163; Saiki, et al., 1989. *Proc. Natl. Acad. Sci. USA* 86: 6230. Such allele specific oligonucleotides are hybridized to PCR 15 amplified target DNA or a number of different mutations when the oligonucleotides are attached to the hybridizing membrane and hybridized with labeled target DNA.

Alternatively, allele specific amplification technology that depends on selective PCR amplification may be used in conjunction with the instant invention. Oligonucleotides used as primers for specific amplification may carry the mutation of interest in the center of the molecule 20 (so that amplification depends on differential hybridization; see, e.g., Gibbs, et al., 1989. *Nucl. Acids Res.* 17: 2437-2448) or at the extreme 3'-terminus of one primer where, under appropriate conditions, mismatch can prevent, or reduce polymerase extension (see, e.g., Prossner, 1993. *Tibtech.* 11: 238). In addition it may be desirable to introduce a novel restriction site in the region of the mutation to create cleavage-based detection. See, e.g., Gasparini, et al., 1992. *Mol. 25 Cell Probes* 6: 1. It is anticipated that in certain embodiments amplification may also be performed using *Taq* ligase for amplification. See, e.g., Barany, 1991. *Proc. Natl. Acad. Sci. USA* 88: 189. In such cases, ligation will occur only if there is a perfect match at the 3'-terminus of the 5' sequence, making it possible to detect the presence of a known mutation at a specific site by looking for the presence or absence of amplification.

30 The methods described herein may be performed, for example, by utilizing pre-packaged diagnostic kits comprising at least one probe nucleic acid or antibody reagent described herein,

which may be conveniently used, e.g., in clinical settings to diagnose patients exhibiting symptoms or family history of a disease or illness involving an ORX gene.

Furthermore, any cell type or tissue, preferably peripheral blood leukocytes, in which ORX is expressed may be utilized in the prognostic assays described herein. However, any biological sample containing nucleated cells may be used, including, for example, buccal mucosal cells.

The invention will be further described in the following examples, which do not limit the scope of the invention described in the claims.

10

**EXAMPLE 1: Cloning and analysis of ORX-like sequences in primates and mouse.**

The isolation of ORX-related sequences has been described in Rouquier et al., *Nature Genet.* (1998) 18, 243-50 and Rouquier et al. (1998) *Hum. Mol. Genet.* 7, 1337-1345. Briefly, 15 100 ng of genomic DNA from each species was subjected to PCR using consensus ORX primers OR5B-OR3B (OR5B (TM2), 5'- CCCATGTA(T/C)TT(G/C/T)TT(C/T)CTC(A/G/T)(G/C)(C/T)AA(C/T)(T/C)T(G/A)TC-3' ; PMY(F/L)FL(S/A/T/G/C)NLS ; OR3B (TM7), (SEQ ID NO: 432) 5'- AG(A/G)C(A/T)(A/G)TAIATGAAIGG(A/G)TTCAICAT-3' (SEQ ID NO:433) ; 20 M(L/F/V/I)NPF(I/M)Y(S/C)L) (SEQ ID NO:434). See Ben-Arie et al., (1994) *Hum. Molec. Genet.* 3, 229-35. A second pair of consensus primers, OR3.1-OR7.1 (OR3.1 (TM3), 5'- GCIATGGCITA(C/T)GA(C/T)(A/C)GITA-3' (SEQ ID NO:435) ; AMAYD(S/R)Y (SEQ ID NO:436) ; OR7.1 (TM7), 5'-A(A/G)I(G/C)(A/T)(A/G)TA(A/G/T)AT(A/G)AAIGG(A/G)TT-3' (SEQ ID NO:437); NPFIY(S/R/T/C/W)(L/F)(SEQ ID NO:438), was also used to amplify primate 25 ORX sequences. See Freitag et al. (1998) *J. Comp. Physiol.* 183, 635-50 and Freitag et al., (1999) *Gene* 226, 165-74.

PCR products were subcloned in the TA vector (InVitrogen), and recombinant clones were identified by PCR. Sequencing of the ORX sequences was performed and sequences were assembled and analyzed. The following species were studied: human (*Homo sapiens*, HSA), 30 chimpanzee (*Pan troglodytes*, PTR), gorilla (*Gorilla gorilla*, GGO), orangutan (*Pongo pygmaeus*, PPY), gibbon (*Hylobates lar*, HLA), macaque (*Macaca sylvanus*, MSY), baboon (*Papio papio*,

PPA), marmoset (*Callithrix jacchus*, CJA), squirrel-monkey (*Saimiri sciureus*, SSC, and *Saimiri boliviensis*, SBO), lemur (*Eulemur fulvus*, EFU, and *Eulemur rubriventer*, ERU), and mouse (*Mus musculus domesticus*, MMU). In addition, a few zebrafish (*Danio rerio*, DRE) sequences were also characterized using primers OR3.1-OR7.1.

5       Pairwise sequence comparisons and multiple alignments were performed using Gap and PileUp from the GCG package (Wisconsin Package version 8).

**EXAMPLE 2:           Construction and screening of an ORX-specific mouse sublibrary.**

10       Mouse ORX clones obtained by PCR as described above were gridded in 96-well microtiter dishes (1536 clones in 8 plates). For hybridization screening, the clones were robot-spotted in duplicate on high-density filters as described in Rouquier et al. (1999) *Mamm. Genome* 10, 1172-75.. Approximately 90% of the clones were identified as ORX genes. This library was screened to identify clones hybridizing to human ORX pseudogene sequences. Human plasmid  
15       DNA probes were radiolabeled to a specific activity of 108-109 cpm/ $\mu$ g by random hexamer priming using ( $\square$ -32P)-dCTP (Amersham) as described in Feinberg et al. (1983) *Anal. Biochem.* 132, 6-13. Filter hybridizations were carried out under standard hybridization conditions, and exposed to Kodak X-ray film at -80°C. See Rouquier et al., (1993) *Genomics* 17, 330-40.

20       Three human ORX probes were used: OR1-72, OR912-47, OR15-71 (DDBJ/GenBank accession numbers U86218, U86230, U86296 respectively).

**EXAMPLE 3: Sequence analysis of mouse ORX sequences.**

To test whether mammals thought to be microsmatic or macrosmatic differ in the fraction of pseudogenes in their ORX repertoire, the ORX sequences in the mouse genome were  
5 surveyed. A mouse sublibrary enriched for ORX-related sequences amplified by PCR from the mouse genome was constructed, and nineteen randomly selected mouse ORX clones were sequenced. All 19 have an uninterrupted open-reading frame (ORF) and are potentially functional. These sequences group primarily in family 1 and vary from ~52 to >99% NSI. In addition, in an attempt to bias in favor of selecting mouse ORX pseudogenes, a search for mouse  
10 ORX sequences homologous to human pseudogenes was performed. One member was chosen from three different ORX pseudogene families: clones 1-72, 15-71 and 912-47 from chromosomes 1, 15 and 11, respectively. *See* Rouquier et al., (1998) *Nature Genet.* 18, 243-50. Each of these genes belongs to one of the 3 main groups of human ORX sequences and has accumulated a number of mutations such as stop codons and indel frameshifts. *See id.* The  
15 amino-acid sequence identity between these three ranges from 31% to 41%.

High density filters from the mouse ORX sublibrary were then hybridized separately with the three human pseudogene probes at a high stringency. Fourteen clones were sequenced on both strands. These sequences showed 38% to 53% ASI to the human sequences used to select them, indicating that they are not the orthologs of the human pseudogenes. All have an  
20 uninterrupted ORF from TM2 to TM7. Together, 33 mouse ORX sequences were sequenced, none of which contained characteristic features of pseudogenes.

**OTHER EMBODIMENTS**

25 While the invention has been described in conjunction with the detailed description thereof, the foregoing description is intended to illustrate and not limit the scope of the invention, which is defined by the scope of the appended claims. Other aspects, advantages, and modifications are within the scope of the following claims.